CHAPTER

MEASURES OF CENTRAL TENDENCY

PAST YEAR QUESTIONS

1. If x and y are related by x - y - 10 = 0 and mode of x is known to be 23, then the mode of y is : **Nov-2006**
(a) 20 (b) 13 (c) 3 (d) 23

2. A man travels at a speed of 20km/hr and then returns at a speed of 30 km/ hr. His average speed of the whole journey is : **Nov-2006**
(a) 25km/hr (b) 24.5km/hr (c) 24km/hr (d) None

3. For a moderately skewed distribution, quartile deviation and the standard deviation are related by : **Nov-2006**
(a) S.D. = $\frac{2}{3}$ Q.D (b) S.D. = $\frac{3}{4}$ Q.D (c) S.D. = $\frac{4}{3}$ Q.D (d) S.D. = $\frac{3}{2}$ Q.D

4. The median of the data 13, 8, 11, 6, 4, 15,2, 18, is : **Feb-2007**
(a) 5 (b) 8 (c) 11 (d) 9.5

5. The sum of the squares of deviations of a set of observations has the smallest value, when the deviations are taken from their: **Feb-2007**
(a) A.M. (b) H. M. (c) G. M. (d) None

6. Which of the following result hold for a set of distinct positive observations ? **May-2007**
(a) A . M. $\geq$ G. M. $\geq$ H. M. (b) G. M. > A. M. > H. M.
(c) G. M. $\geq$ A. M. $\geq$ H. M. (d) A . M. > G. M > H. M.

7. If the A. M. and H.M. for two numbers are 5 and 3.2 respectively then the G.M. will be : **Aug-2007**
(a) 4.05 (b) 16 (c) 4 (d) 4.10

8. ____ are used for measuring central tendency, dispersion and skewness : **Aug-2007**
(a) Median (b) Deciles (c) Percentiles (d) Quartiles

9. An aeroplane flies from A to B at the rate of 500 km / hr and comes back from B to A at the rate of 700 km / hr. The average speed of the aeroplane is : **Nov-2007**
(a) 600km/hr (b) 583.33 km/hr (c) $100\sqrt{35} km/hr$ (d) 620 km/nr.

10. For a moderately skewed distribution, which of the following relationship holds ? **Nov-2007**
(a) Mean - Median = 3 (Median -Mode) (b) Median -Mode = 3 (Mean -Median)
(c) Mean - Mode = 3 (Mean -Median) (d) Mean - Median = 3 (Mean -Mode)

11. _____ & _____ are called ratio averages **Nov-2007**
(a) H.M. & G. M. (b) H.M. & A.M. (c) A. M. & G. M. (d) None

12. Extreme values have _____ effect on mode: **Feb-2008**
(a) High (b) low (c) No (d) None of these

13. The mean salary for a group of 40 female workers is ₹ 5200 per month and that for a group of 60 male workers is ₹ 6800 per month. What is the combined salary ? **Feb-2008**
(a) ₹6160 (b) ₹ 6280 (c) ₹6890 (d) ₹6920

14. If there are two groups with 75 and 65 as harmonic means and containing 15 and 13 observations, then the combined H.M. is given by : **June-2008**
(a) 70 (b) 80 (c) 70.35 (d) 69.48

15. The G.M. of 4, 6 and 8 is : **June-2008**
(a) 4.77 (b) 5.32 (c) 6.14 (d) 5.77

16. G.M is a better measure than others when, **Dec-2008**
(a) ratios and percentages are given (b) interval of scale is given
(c) Both (a) and (b) (d) Either (a) or (b)

17. **The median of $x, \frac{x}{2}, \frac{x}{3}, \frac{x}{4}$ is 10.Find x where x > 0** **June-2009**
(a) 24 **(b) 32** **(c) 8** **(d) 16**

Answer:
(a) **Step -1** : Arrange the data in ascending order.

$\frac{x}{5}, \frac{x}{3}, \frac{x}{2}$, x

Step – 2: Median = $\left(\frac{n+1}{2}\right)^{th}$ term

= $\left(\frac{4+1}{2}\right)^{th}$ term

= $(2.5)^{th}$ term

So, Median = 2nd term + 0,5 (3rd term – 2nd term)

$10 = \frac{x}{3} + 0.5\left(\frac{x}{2} - \frac{x}{3}\right)$

$10 = \frac{x}{3} + 0.5\left(\frac{3x-2x}{6}\right)$

$10 = \frac{x}{3} + \frac{x}{12}$

$10 = \frac{4x-x}{12}$

$10 = \frac{5x}{12}$

$x = \frac{10\times12}{5}$

$x = 24$

∴ The value of x is 24.

18. The average salary of 50 men was ₹ 80 but it was found that salary of 2 of them were ₹ 46 and ₹ 28 which was wrongly taken as ₹ 64 and ₹ 82. The revised average salary is : **June-2009**

(a) ₹ 80 (b) ₹ 78.56 (c) ₹ 85.26 (d) ₹ 82.92

Answer:

(b) Mean = $\frac{\sum x}{N}$

$80 = \frac{\sum x}{50}$

∴ Wrong $\sum x = 80 \times 50 = 4000$

So, corrected $\sum x = 4000 - 64 - 82 + 46 + 28 = 3928$

Therefore, revised average salary = $\frac{\sum x}{N} = \frac{3,928}{50}$

Revised Average Salary = Rs. 78.56

19. If A be the A.M. of two positive unequal quantities X and Y and G be their G.M., then ; **June-2009**

(a) A < G (b) A > G (c) A ≤ G (d) A ≥ G

Answer:

(b) For any set of positive observation, we have the following inequality:

A.M. ≥ G.M. ≥ H.M.

The equality sign occurs, when all the observation are equqal.

If all the observations are positive and unequal then the inequality is:

A.M.> G.M. >H.M.

Therefore, we can conclude that A.M. > G.M. for positive unequal quantities.

20. When mean is 3.57 and mode is 2.13 then the value of median is _____ . **Dec-2009**

(a) 3.09 (b) 5.01 (c) 4.01 (d) None of these+

Answer:

(a) Mean = 3.57

Mode = 2.13

As per the empirical formula,

Mode = 3 Median – 2 Mean

2.13 = 3 Me - 2× 3.57

2.13 = 3 Me – 7.14

3 Me = 2.13 + 7.14

3 Me = 9.27

Me = $\frac{9.27}{3}$ = 3.09.

∴ Median = 3.09

21. The harmonic mean of 1, 1/2, 1/3 …… 1/n is **June-2010**

(a) 1/(n + 1) (b) 2/(n + 1) (c) (n + 1)/2 (d) 1/(n - 1)

Answer:

(b) For a given set of non-zero observations, harmonic mean is defined as the reciprocal of the A.M. of the reciprocals of the observations. Therefore, H.M. for a variable x is given by

$$H=\frac{n}{\sum(1/x_i)}$$
$$=\frac{n}{1+2+3+\cdots..+n}$$
$$=\frac{n}{\frac{n}{2}(n+1)}$$
$$=\frac{2}{(n+1)}$$

22. The mean weight of 15 students is 110 kg. The mean weight of 5 of them is 100 kg. and of another five students is 125 kg. the mean weight of the remaining students is: June-2010

(a) 120 (b) 105 (c) 115 (d) None of these

Answer:

(b) Total weight of 1st five students = 5 × 100 = 500

Total weight of another five students = 5 × 125 = 625

Total weight of 10 students = 500 + 625 = 1125

Total weight of 15 students = 15 × 110 = 1650

∴ Total weight of remaining 5 students = 1650 – 1125 = 525

∴ Mean weight of remaining 5 students = $\frac{525}{5}$ = 105

23. In a class of 11 students, 3 students were failed in a test. 8 students who passed secured 10,11,20,15,12,14,26 and 24 marks respectively. What will be the median marks of the students June-2010

(a) 12 (b) 15 (c) 13 (d) 13.5

Answer:

(a) Let x_1, x_2, x_3 be the 3 students failing in test Marks of 11 students in ascending order are –

x_1 , x_2 , x_3, 10 ,11 , 12 , 14 , 15 , 20, 24 , 26

Median of discrete series = $\frac{n+1^{th}}{2}$ term

$= \frac{11+1^{th}}{2}$ term

$= 6^{th}$ term

= 12

24. A lady travel at a speed of 20km/h and returned at quicker speed. If her average speed of the whole journey is 24km/h, find the speed of return journey (in km/h) Dec-2010

(a) 25 (b) 30 (c) 35 (d) 38

Answer:

(b) In this question we will apply formula for harmonic mean as equal Distance(s) covered with variable speed.

Since, H.M. = $\frac{N}{\sum 1/x}$

Let x km/hr be speed of return journey

$$24 = \frac{2}{\frac{1}{20}+\frac{1}{x}}$$
$$24 = \frac{2\times 20x}{x+20}$$

24x + 480 = 40x

16x = 480

x = 30 km/hr.

25. Let the mean of the variable 'x' be 50, then the mean of u=10+5x will be : **Dec-2010**

(a) 250 (b) 260 (c) 265 (d) 273

Answer:

(b) u = 10+ 5x

Since Mean is dependent of change of Origin & Scale

∴ New Mu = 10+ 5 Mx

Mu = 10+ 5 × 50 = 260

26. If the difference between mean and Mode is 63, then the difference between Mean and Median will be _____. **June-2011**

(a) 63 (b) 31.5 (c) 21 (d)None of the above.

Answer:

(c) Given : Mode – Mean = 63

We know, the Empirical Relationship between Mean, Meadian & Mode i.e.

(Mode – Mean) = 3(Meadian – Mean)

∴ Meadian – Mean = $\frac{63}{3}$ = 21

27. If the Arithmetic mean between two numbers is 64 and the Geometric mean between them is 16. The Harmonic Mean between them is _____. **June-2011**

(a) 64 (b) 4 (c) 16 (d) 40

Answer:

(b) Given : A.M = 64

G.M = 16

H.M = ?

We know, $(G.M)^2 = A.M \times H.M$

$(16)^2 = 64 \times H.M$

∴ H.M = $\frac{256}{64}$

∴ H.M = 4

28. The average of 5 quantities is 6 and the average of 3 is 8. What is the average of the remaining two. **June-2011**

(a) 4 (b) 5 (c) 3 (d) 3.5

Answer:

(c) The avg. of 5 quantities = 6

∴ The sum of 5 quantities = 6 × 5 = 30

∴ The avg. of 3 quantities = 8

∴ The sum of 3 quantities = 8 × 3 = 24

∴ Sum of Remaining Two Nos. = 30 – 24= 6

∴ Avg. of Remaining two = $\frac{6}{2}$ = 3

29. The median of following numbers, which are given is ascending order is 25. Find the Value of X. **Dec-2011**

11	13	15	19	(x + 2)	(x + 4)
30	35	39	46		

a) 22 b) 20 c) 15 d) 30

Answer:

(a) Numbers in Ascending Order are

11, 13, 15, 19, (x+2) , (x+4) , 30 , 35 , 39 , 46

Here

No. of terms (N) = 10

Median = $\frac{1}{2}\left[\frac{N^{th}}{2} term + \left(\frac{N}{2}+1\right)^{th} term\right]$

25= $\frac{1}{2}\left[\frac{10^{th}}{2} term + \left(\frac{10}{2}+1\right)^{th} term\right]$

25= $\frac{1}{2}$ [5^{th} term + 6^{th} term]

25= $\frac{1}{2}$[(x+2)+(x+4)]

50 = 2x +6

2x = 50-6

2x = 44

x = 22

30. The average age of a group of 10 students was 20 years. The average age increased by two

years when two new students joined the group. What is the average age of two new students who joined the group? **Dec-2011**

a) 22 years b) 3 years c) 44 years d) 32 years

Answer:

(d) ∴ Average age of 10 students = 20 yrs

∴ the sum of age of 10 students = 20 × 10 = 200 yrs

if two boys are Increased

the total no. of students = 10+2 = 12

and Average Increased by 2 yrs

Then New Average = 20 +2 = 22

∴ The Average age of 12 students = 22

The sum of age of 12 students = 22×12 = 264

The sum of age of two boys = 264 – 200 = 64

Average Age of two boys = $\frac{64}{2}$ = 32

31. Geometric Mean of three observations 40, 50 and X is: 10. The value of X is **June-2012**

(a) 2 (b) 4 (c) 1/2 d) None of the above.

Answer:

(c) Given G. M of three observation = 10

Given No. of observation (n) = 3

$x_1 = 40, x_2 = 50, x_3 = X$

Geometrical Mean

$G.M = (x_1 \cdot x_2 \cdot x_3)^{1/3}$

$10 = (40 \cdot 50 \cdot x)^{1/3}$

$(10)^3 = 40 \cdot 50 \cdot x$

$1{,}000 = 40 \cdot 50 \cdot x$

$x = \frac{1{,}000}{40 \cdot 50}$

$x = \frac{10}{20}$

$x = \frac{1}{2}$

32. The mean of first three terms is 14 and mean of next two terms is 18. The mean of all five term is. **June-2012**

(a) 14.5 (b) 15 (c) 14 (d) 15.6

Answer:

(d) Given x_1, x_2, x_3, x_4, x_5 (Say)

∴ For first three terms (x_1, x_2, x_3)

We know ∴ Mean = $\frac{\sum x}{n}$

∴ $14 = \frac{(\sum x)_{(x1,x2,x3)}}{3}$

$(\sum x)_{(x1,x2,x3)} = 42$

& also $18 = \frac{(\sum x)(x_{4,x_5)}}{2}$

∴ $(\sum x)(x_{4,x_5)} = 36$

∴ $(\sum x)(x_1, x_2, x_3, x_4, x_5) = (\sum x)(x_{1,x_{2,x_3)}} + (\sum x)(x_{4,x_5)}$

$= 42 + 36$

$= 78$

Mean of all 5 terms $= \frac{(\sum x)(x1,x2,x3,x4,x5)}{5}$

$= \frac{78}{5}$

$= 15.6$

33. The mean salary of a group of 50 persons is ₹ 5,850. Later on it is discovered that the salary of one employee has been wrongly taken as ₹ 8,000 instead of ₹ 7,800. The corrected mean salary is **Dec-2012**

(a) ₹ 5,854 (b) ₹ 5,846 (c) ₹ 5,650 (d) None of the above

Answer:

(b) Mean $\bar{x}=\frac{\sum x}{N}$

In correct $\sum x$ = N $\bar{x}$

= 50 × 5,850

= 2,92,300

Correct $\sum x$ = In correct $\sum x$ + Right value – wrong value

= 2,92,500 +7,800 – 8,000

= 2,92,500 – 200

= 2,92,300

Correct mean = $\frac{\text{Correct } \sum x}{N}$

= $\frac{2,92,300}{50}$

= 5,846

34. If the mode of a data is 18 and mean is 24, then median is____ **Dec-2012**

(a) 18 (b) 24 (c) 22 (d) 21

Answer:

(c) Mode = 18 , Mean = 24

Mode = 3 Median – 2 Mean

18 = 3 Median - 2×24

18 = 3 Median – 48

18 + 48 = 3 Median

66 = 3 Median

Median = $\frac{66}{3}$ = 22

35. For data on frequency distribution of weights:**Dec-2012**70, 73, 49, 57, 56, 44, 56, 71, 65, 62, 60, 50, 55, 49, 63 and 45

If we assume class length as 5, the number of class intervals would be

(a) 5 (b) 6 (c) 7 (d) 8

36. The point of intersection of the "less than" and "more than" ogives correspond to **Dec-2012**

(a) Mean (b) Mode (c) Median (d) 10th Percentile

37. A man travels form Agra to Gwalior at an average speed of 30 km per hour and back at an average speed of 60 km per hour. What is his average speed? **Dec-2012**

(a) 38 km per hour (b) 40 km per hour (c) 45 km per hour (d) 35 km per hour

Answer:

(b) Average speed = $\frac{2xy}{x+y}$

Given x = 30 km/h & y = 60 km/h

Average speed = $\frac{2\times30\times60}{30+60}$

= $\frac{2\times\cancel{30}\times\cancel{60}_{20}}{\cancel{90}_{3}}$

= 40 km per hour

38. Which of the following measures of central tendency cannot be calculated by graphical method? **June-2013**

a) Mean b) Mode c) Median d) Quartile

39. Geometric mean of 8, 4, 2 is ? **June-2013**

a) 4 b) 2 c) 8 d) None of these

Answer:

(a) G.M. = $(x_1 \cdot x_2 \cdot x_3)^{1/3}$

= $(8 \cdot 4 \cdot 2)^{1/3}$

= $(64)^{1/3}$

= $4^3 \times \frac{1}{3}$

= 4

40. The average age of 15 students of a class is 15 years. Out of them, the average age of 5 students is 14 years and that of the other 9 students is 16 years. The age of the 15th students is:

June-2013

a) 11 years b) 14 years c) 15 years d) None of these

Answer:

(a) The age of 15^{th} student

$= (15\times15) - [(5\times14) + (9\times16)]$

$= 225 - [70+144]$

$= 225 - 214$

$= 11$

41. In normal distribution mean, median and mode are **Dec-2013**

(a) Equal (b) Not Equal (c) Zero d) None of above.

42. The kind of averages whose value can be determined graphically? **Dec-2013**

(a) Mode, Median (b) Mean, Mode (c) Mean, Median (d)None of the above.

43. Which of the following statement is true? **June-2014**

a) Median is based on all the observations b) The Mode is the mid value

c) The Median is the 2nd Quartile d) The Mode is the 5th decile.

44. The mean of the following data is 6. Find the value of 'P'. **June-2014**

x:	2	4	6	10	P+5
f:	3	2	3	1	2

a) 4 b) 6 c) 8 d) 7

Answer:

(d)

x	f	fx
2	3	6
4	2	8
6	3	18
10	1	10
P+5	2	2P +10
	N=11	$\sum fx$ = 2P+52

$\bar{x} = \frac{\sum fx}{N}$

$6 = \frac{2P+52}{11}$

$6 \times 11 = 2P + 52$

$66 = 2P + 52$

$2P = 14$

$P = 7$

45. The third decile for the numbers 15, 10, 20, 25, 18, 11, 9, 12, is : **Dec-2014**

a) 13 b) 10.70 c) 11 d) 11.50

Answer:

(b) Write the terms in Ascending order 9,10,11,12,15,18,20,25

No. of terms(N) = 8

Third Decile $D_3 = \frac{3(N+1)^{th}}{10}$ term

$= \frac{3(8+1)^{th}}{10}$ term

$= 2.7^{th}$ term

$= 2^{nd}$ term + $0.7(3^{rd}$ term $- 2^{nd}$ term)

$= 10 + 0.7(11-10)$

$= 10 + 0.7$

$= 10.70$

46. A random variable X has uniform distribution on the interval (–3, 7). The mean of the distribution is: **Dec-2014**

a) 2 b) 4 c) 5 d) 6

Answer:

(a) A random variable x has uniform distribution. Given Interval (-3, 7).

Mean = $\frac{7+(-3)}{2} = \frac{7-3}{2} = \frac{4}{2} = 2$

47. If the arithmetic mean of two numbers is 10 and the geometric mean of these numbers is 8, then the harmonic mean is : **Dec-2014**

a) 9 b) 8.9 c) 6.4 d) None of these

Answer:

(c) Given Arithmetic Mean (A.M.) = 10

(G.M.) = 8

(H.M.) = ?

We know that $(G.M.)^2$ = A.M. × H.M.

$(8)^2 = 10 \times H.M.$

H.M. = $\frac{(8)^2}{10} = \frac{64}{10} = 6.4$

48. The harmonic mean H of two numbers is 4 and their arithmetic mean A and the geometric mean G satisfy the equation $2A + G^2 = 27$, then the numbers are **June-2015**

a) (1, 3) b) (9, 5) c) (6, 3) d) (12, 7)

Answer:

(c) Let two Nos. are a & b

Given Harmonic mean of two Nos. (H) = 4

$\frac{2ab}{a+b} = 4$

$2ab = 4(a + b)$

$ab = 2(a + b)$ ……(1)

Given $2A + G^2 = 27$

$2\frac{(a+b)}{2} + ab = 27$

$a + b + 2(a + b) = 27$

$a + b + 2a + 2b = 27$

$3a + 3b = 27$

$3(a + b) = 27$

$a + b = 9$ ……(2)

Solving equation (1) & (2) we get

a = 6, b = 3

49. Quartiles can be determined graphically using : **Dec-2015**

a) Histogram b) Frequency polygon c) Ogive curve d) Pie chart

50. If the mean of two numbers is 30and geometric mean is 24 then what will be these two numbers? : **June-2016**

a) 36 and 24 b) 30 and 30 c) 48 and 12 d) None of these

Answer:

(c) Let two number be a & b

A.M. = $\frac{a+b}{2}$

$30 = \frac{a+b}{2}$

$a + b = 60$ _____(1)

G.M $= \sqrt{ab}$

$24 = \sqrt{ab}$

$ab = 576$_____(2)

Solving (1) & (2) we get

a = 48 and b = 12

51. For moderately skewed distribution of marks in commerce for a group of 200 students the mean marks and mode marks were found to be 55.60 and 46.What is the median marks? **Dec-2016**

(a) 55.5 (b) 60.5 (c) 52.4 (d) None of these

Answer:

(c) Here Mean ($\bar{x}$) = 55.60

Mode (M_0) = 46

For moderately skewed distribution of marks

Mode = 3 Median – 2 Mean

46 = 3 Median – 2 × 55.60

46 = 3 Median – 111.20

3 Median = 46 + 111.20

3 Median = 157.20

Median = $\frac{157.20}{3}$ = 52.40

52. The average of 10 observations is 14.4 if the average of first 4 observations is 16.5 The average of remaining 6 observations is: **Dec-2016**

(a) 13.6 (b) 13.0 (c) 13.2 (d) 12.5

Answer:

(b) Given $n_1 = 4$ $n_2 = 6$

$\bar{X}_1 = 16.5$ $\bar{X}_2 = x$ (let)

Combined Average $\bar{X} = 14.4$

Combined Average $(\bar{x}) = \frac{n_1\bar{X}_1 + n_2\bar{X}_2}{n_1 + n_2}$

$14.4 = \frac{4\times16.5+6\times x}{4+6}$

$\frac{14.4}{1} = \frac{66.0+6x}{10}$

14.4×10 = 66 + 6x

144 = 66 + 6x

6x = 144 – 66

6x = 78

x = $\frac{78}{6}$ = 13

53. The ordering of a particular design of a cloth show room, a _____ size be more appropriate. **Dec-2016**

(a) median (b) mean (c) mode (d) all of these

54. The geometric mean of three numbers 40,50 and x is 10. Find x **Dec-2016**

(a) 5 (b) 4 (c) 2 (d) 1/2

55. The rates of returns from three different shares are 100%, 200% and 400% respectively. The average rate of return will be: **June-2017**

a) 350% b) 233.33% c) 200% d) 300%

Answer:

(c) If given data are in the form of % then

We use G.M. for average

G.M. = $(x_1 \cdot x_2 \cdot x_3)^{1/3}$

= $(100\times200\times400)^{1/3}$

= $(80,00,000)^{1/3}$

= $(200)^{3\times1/3}$

= 200%

56. If geometric mean is 6 and arithmetic mean is 6.5, then harmonic mean will be: **June-2017**

a) $6^2/6.5$ b) $6/6.5^2$ c) 6/6.5 d) None of the above.

Answer:

(a) ∵ G.M = 6 A.M = 6.5

H.M = $\frac{(G.M)^2}{A.M} = \frac{6^2}{6.5}$

57. A company's past 10 years average earning is ₹ 40 crores. To have the same average earning for 11 years including these 10 years, how much earning must be made by the company in the 11th year ? **June-2017**

a) ₹ 40 crores b) ₹ 40 × 10

c) More than ₹ 40 crores d) None of the above

Answer:

(a) Given $n_1 = 10$ $n_2 = 1$ $\bar{x} = 40$

$\bar{x}_1 = 40$ $\bar{x}_2 = x$

Combined mean $\bar{x} = \frac{n_1\bar{x}_1 + n_2\bar{x}_2}{n_1 + n_2}$

$40 = \frac{10\times40 + 1\times x}{10+1}$

$40 = \frac{400+x}{11}$

$440 = 400 + x$

$x = 440-400$

$x = 40$ crores

58. A person purchases 5 rupees worth of eggs from 10 different markets. you are to find the average number of eggs per rupee purchased from all the markets taken together. the suitable average in this : **June-2017**

a) A.M b) G.M c) H.M d) None of the above

59. Mean of 7, 9, 12, x, 4, 11 & 5 is 9. Find the missing observation: **Dec-2017**

(a) 13 (b) 15 (c) 12 (d) None of these

60. If all the frequencies are equal than which will doesn't exist: **Dec-2017**

(a) Mean (b) Median (c) Mode (d) None of these

61. _____ is the reciprocal of the AM of reciprocal of observations: **Dec-2017**

(a) HM (b) GM (c) Both (d) None of these

62. Mean deviation is least when deviations are taken from: **Dec-2017**

(a) Mean (b) Median (c) Mode (d) Harmonic mean

63. If the mean value of seven numbers 7, 9, 12, X, 4, 11 and 5 is 9, then the missing number X will be: **Dec-2017**

(a) 13 (b) 14 (c) 15 (d) 8

Answer:

(c) Given observations are

7, 9, 12, x, 4, 11, 5

No. of observation(N) = 7

Sum of all observation $\sum x = 7 + 9 + 12 + x + 4 + 11 + 5$

$= 48 + x$

Mean $\bar{x} = \frac{\sum x}{N}$

$9 = \frac{48+x}{7}$

$63 = 48 + x$

$x = 15$

64. When all observations occur with equal frequency _____ does not exist. **Dec-2017**

(a) median (b) mode (c) mean (d) none of the above.

65. If the variables x and z are so related that z = ax+b for each x = x, where a and b are constant, then $\bar{z} = a\bar{x} + b$ **May-2018**

(a) True (b) false (c) both (d) none

66. Relation between mean, median and mode is **May-2018**

(a) mean-mode = 2 (mean-median) (b) mean-median = 3(mean-mode)

(c) mean-median = 2 (mean-mode) (d) mean-mode = 3(mean-median)

67. If each item is reduced by 15 A. M is **May-2018**

(a) reduced by 15 (b) increased by 15 (c) reduced by 10 (d) none

68. For 899, 999, 391, 384, 390, 480, 485, 760, 111, 240 Rank of median is **May-2018**

(a) 2.75 (b) 5.5 (c) 8.25 (d) none

69. The median of the date 5, 6, 7, 8, 9, 10, 11, 12, 15, 18, 18 and 19 is **Nov-2018**

(a) 10.5 (b) 10 (c) 11 (d) 11.5

70. The mean of 20 items of a data is 5 and if each item is multiplied by 3, then the new mean will be **Nov-2018**

(a) 5 (b) 10 (c) 15 (d) 20

71. The Geometric mean of 3, 6, 24 and 48 is **Nov-2018**

(a) 8 (b) 12 (c) 24 (d) 6

Answer:

(b) G.M. $= (x_1 . x_2 . x_3 . x_4)^{1/4}$

$= (3\times6\times24\times48)^{1/4}$

$= 4\sqrt{3 \times 6 \times 24 \times 48}$

$= 4\sqrt{3 \times 3 \times 2 \times 2 \times 2 \times 2 \times 3 \times 2 \times 2 \times 2 \times 2 \times 3}$

$= 4\sqrt{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3}$

$= 2\times2\times3$

$= 12$

72. Which one of the following is not a central tendency? **Nov-2018**

(a) Mean Deviation (b) Arithmetic mean (c) Median (d) Mode

73. If total frequencies of three series are 50, 60 and 90 and their means are 12, 15 and 20 respectively, then the mean of their composite series is **Nov-2018**

(a) 16 (b) 15.5 (c) 16.5 (d) 14.5

74. If in a moderately skewed distribution the values of mode and mean are 32.1 and 35.4 respectively, then the value of the median is **Nov-2018**

(a) 34.3 (b) 33.3 (c) 34 (d) 33

Answer:

(a) Given:

Mode = 32.1, Median = ?

Mean = 35.4

Mode = 3 Median – 2 Mean

32.1 = 3 Median – 2 × 35.4

32.1 = 3 Median – 70.8

3 Median = 32.1+70.8

3 Median = 102.9

Median = $\frac{102.9}{3}$ = 34.3

75. If the mean of the following distribution is 6 then the value of P is **Nov-2018**

X:	2	4	6	10	P + 5
F:	3	2	3	1	2

(a) 7 (b) 5 (c) 8 (d) 11

Answer:

(a)

x	f	f.x.
2	3	6
4	2	8
6	3	18
10	1	10
P+5	2	2P+10
	N=11	$\sum fx = 2P + 52$

$\bar{x} = \frac{\Sigma fx}{N} = \frac{2P+52}{11}$

Given:

$\bar{x} = 6$

$\frac{6}{1} = \frac{2P+52}{11}$

2P + 52 = 66

2P = 66-52

2P = 14

P = 7

76. The AM of 15 Observation is 9 and the AM of first 9 Observation is 11 and then AM of remaining Observations is **June-2019**

(a) 11 (b) 6 (c) 5 (d) 9

Answer:

(b) A.M of 15 observations = 9

Sum of 15 observations = 9×15

= 135

A.M of 9 observations = 11

Sum of 9 observations = 11×9

= 99

Sum of remaining 6 observations = 135 – 99

= 36

Average of 6 observation = $\frac{36}{6}$

77. In a moderately Skewed distribution the values of means & median are 12 & 8 respectively. The value of mode is **June-2019**

(a) 0 (b) 12 (c) 15 (d) 30

Answer:

(a) Given,

Mean = 12

Median = 8

Mode = 3 Median – 2 Mean

= 3×8 - 2×12

= 24 – 24

= 0

78. Which of the following is positional average ? **June-2019**

(a) Median (b) GM (c) HM (d) AM

79. For a symmetric distribution: **June-2019**

(a) Mean = Median = Mode (b) Mode = 3 Median – 2 Mean

(c) Mode = $\frac{1}{3}$ Median = $\frac{1}{2}$ Mean (d) None

80. For the distribution **June-2019**

X:	1	2	3	4	5	6
F:	6	9	10	14	12	8

The value of median is

(a) 3.5 (b) 3 (c) 4 (d) 5

Answer:

(c)

x	1	2	3	4	5	6
f	6	9	10	14	12	8
C.F	6	15	25	39	51	59

N = 59

Median (Me) = $\left(\frac{N+1}{2}\right)^{th}$ term

= $\left(\frac{59+1}{2}\right)^{th}$ term

= 30^{th} term

= 4

81. If the AM & GM of two numbers are 30 and 24 respectively. Find the no.'s. **Nov-2019**

(a) 12 and 24 (b) 48 and 12 (c) 30 and 30 (d) 40 and 20

Answer:

(b) Let the two no.'s be a and b

AM = 30 GM = 24

$\frac{a+b}{2}$ = 30 $\sqrt{ab}$ = 24 (-2)

a+b = 60
a = 60 – b (-1)
Put Eq 1 in Eq 2
$\sqrt{(60-b)b} = 24$
On squaring both sides
(60- b) b = 576
$60b - b^2 = 576$
$b^2 - 60b + 576 = 0$
$b^2 - 48b - 12b + 576 = 0$
b (b- 48) – 12(b- 48) = 0
(b -12) (b -48) = 0
b = 12 or b = 48
a = 60 - 12 a = 60 – 48
a = 48 a = 12
(12, 48) or (48, 12)
So the two no.'s are 48 and 12
After Method [Do by hit and trial]
i.e. Try with the given options whether their AM is 30 and GM 24

82. Find mode of the following date **Nov-2019**

3 – 6	6 – 9	9 – 12	12 – 15	15 – 18	18 – 21
2	5	10	23	21	12

(a) 25 (b) 4.6 (c) 14.6 (d) 13.5

Answer:

(c)

CI	f
3 - 6	2
6 – 9	5
9 – 12	10
12 – 15	23 *Modal Class
15 - 18	21
18 - 21	12

Since 23 is the highest frequency, so 12 – 15 is the modal class.
So, $f_1 = 23$, $f_0 = 10$, $f_2 = 21$
$L_1 = 12$ i = 3

$$\text{Mode} = L_1 + \frac{f_1 - f_0}{f_1^2 - f_0 - f_2} \times i$$
$$= 12 + \frac{23-10}{2(23)-10-21} \times 3$$
$$= 12 + \frac{13}{15} \times 3$$
$$= 12 + 2.599$$
$$= 14.59$$
$$= 14.6 \text{ (approx)}$$

83. Histogram is used to represent **Nov-2019**
(a) Mode (b) Median (c) Percentile (d) Quartile

84. Find the median of the following: **Nov-2019**

CI	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
f	2	3	4	5	6

(a) 35 (b) 32 (c) 36 (d) 37.5

Answer: (b)

CI	f	c.f.
0 – 10	2	2
10 – 20	3	5
20 – 30	4	9
*30 – 40	5	14
40 – 50	6	20

$$\sum f = 20$$

N = 20 $\frac{N}{2} = 10$

So 30 – 40 is the median class

L, = 30 C=> Pre. Cof. of median class

C => 9 F => 5

$$\text{Median} = L_1 + \frac{(N/2 - C)}{f} \times i$$

$$= 30 + \frac{(10-9)}{5} \times 10$$

$$= 30 + 2$$

$$= 32$$

85. Find the mode of the following: **Nov-2019**

0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
7	14	22	34	20	19

(a) 32 (b) 34.61 (c) 25.42 (d) 35

Answer:

(b)

CI	f
0 – 10	7
10 -20	14
20 – 30	22
*30 -40	34
40 – 50	20
50 – 60	19

Since 34 is the highest frequency so, 30 – 40 is the modal class

$f_1 = 34$ $f_0 = 22$ $f_2 = 20$

i = 10

$$\text{Mode} = L_1 + \frac{f_1 - f_0 \times i}{2f_1 - f_0 - f_2}$$

$$= 30 + \frac{(34-22)}{2\times34-22-20} \times 10$$

$$= 30 + \frac{12}{26} \times 10$$

$$= 34.61$$

86. $\sum_{i=1}^{n}\left(\bar{x} - x_i\right)$ is equal to **Nov-2019**

(a) $\bar{x}\sum_{i=1}^{n} x_i$ (b) $n\left(\bar{x}\sum_{i=1}^{n} x_i\right)$ (c) $\bar{x} - n\,\bar{x}$ (d) Zero

Answer:

(d) $\sum_{i=1}^{n}(\bar{x} - x_i) = 0$

Since the sum of deviations about their AM is always zero.

87. Given the weights for the numbers 1, 2, 3… n are respectively 1^2 ,2^2, 3^2 …. N^2 then weighted HM is _____ . **Nov – 2020**

(a) $\frac{2n+1}{4}$ (b) $\frac{2n+1}{6}$ (c) $\frac{2n+1}{3}$ (d) $\frac{2n+1}{2}$

Answer:

(c) Weight => f

Here

x	**f**	**f/x**
1	1^2	$1^2/1 = 1$
2	2^2	$2^2/2 = 2$
3	3^2	$3^2/3 = 3$

4	4^2	1
n	n^2	$n^2/n = n$
	$N = \sum n^2$	$\sum (f/x) = \sum n$

H.m. $= \frac{N}{\sum(f/x)} = \frac{\sum n^2}{\sum n}$

$= \frac{\frac{x(n+1)(2n+1)}{6}}{\frac{n(n+1)}{2}}$

$= \frac{(2n+1)}{3}$

88. Which measure is suitable for open- end classification? **Nov – 2020**

(a) Median (b) Mean (c) Mode (d) GM

Answer:

(a) For open-end classification median is suitable.

89. 50^{th} Percentile is equal to **Nov – 2020**

(a) Median (b) Mode (c) Mean (d) None

Answer:

(a) $P_{50} = \frac{50(n+1)}{100}$ = median

90. The harmonic mean A and B is 1/3 and harmonic mean of C and D is 1/5. The harmonic mean of ABCD is **Nov – 2020**

(a) 8/15 (b) ¼ (c) 1/15 (d) 5/3

Answer:

(b) Here, H.M. of A and B $= \frac{1}{3}$

H.M. of C and D $= \frac{1}{5}$

H.M. of A and B $= \frac{N}{\sum(1-x)}$

$\frac{1}{3} = \frac{2}{\frac{1}{A}+\frac{1}{B}}$

$\frac{1}{A} + \frac{1}{B} = 6$ ----------(i)

H.M. of C and D $= \frac{N}{\sum(1/x)}$

$\frac{1}{5} = \frac{2}{\frac{1}{C}+\frac{1}{D}}$

$\frac{1}{C} + \frac{1}{D} = 10$ ----------(ii)

H.M. of A,B,C,D $= \frac{N}{\sum(1/x)}$

$= \frac{4}{\left(\frac{1}{A}+\frac{1}{B}+\frac{1}{C}+\frac{1}{D}\right)}$

$= \frac{4}{6+10}$

$= \frac{4}{16}$

$= \frac{1}{4}$

91. Which one of these is least affected by extreme values? **Nov – 2020**

(a) Mean (b) Median (c) Mode (d) None

92. A fire engine rushes to a place of fire accident with a speed of 110 kmph and after the completion of operation returned to the base at a speed of 35 kmph. The average speed per hour in per-direction is obtained as _____ speeds. **Nov – 2020**

(a) Average of (b) H M of (c) G M of (d) Half of HM of

Answer:

(b) H.M. because if data are given in speed, distance and time we use H.M. and

Average Speed $= \left(\frac{2xy}{x+y}\right)$

93. The matches data is given. Then which of the following cannot be found? **Nov – 2020**

(a) least score (b) Highest score (c) Best score (d) Median score

94. If the AM and HM of two numbers are 6 and 9 respectively. Then GM is **Nov – 2020**

(a) 7.35 (b) 8.5 (C) 6.75 (d) None

Answer:

(a) given A.M. = 6

H.M. = 9

G.M. $= \sqrt{A \times H}$

$= \sqrt{6 \times 9}$

$= \sqrt{54}$

$= 7.35$

95. From the record on sizes sold in a shop. One can compute the following to determine the most preferred shoe size. **Jan – 2021**

(a) Mean (b) Median (c) Mode (d) Range

96. Which of the following measure does not possess mathematical properties? **Jan – 2021**

(a) Arithmetic mean (b) Geometric mean (c) Harmonic mean (d) Median

97. if Y = 3 + (4.5) × and the mode for x – value is 20, then the mode for y – value is **Jan – 2021**

(a) 3.225 (b) 12 (c) 24.5 (d) 93

Answer:

(d) Here, $y = 3 + 4.5x$

Mode $y = 3 + (4.5) \times$ Mode of x

$= 3 + 4.5 \times 20$

$= 3 + 90$

$= 93$

98. If There are two groups with n_1 and n_2 observations and H_1 and H_2 are respective harmonic means, then the harmonic mean of combined observation is **Jan – 2021**

(a) $\frac{n_1H_1+n_2H_2}{n_1+n_2}$ (b) $\frac{n_1H_1+n_2H_2}{H_1+H_2}$ (c) $\frac{n_1+n_2}{n_1H_1+n_2H_2}$ (d) $\frac{(n_1+n_2)H_1+H_2}{n_1H_2+n_2H_1}$

Answer:

(d) Combined H.M. $= \frac{n_1+n_2}{\frac{n_1}{H_1}+\frac{n_2}{H_2}}$

$= \frac{(n_1+n_2)}{\frac{n_1H_2+n_2H_1}{H_1H_2}}$

$= \frac{(n_1+n_2)H_1H_2}{n_1H_2+n_2H_1}$

99. There are n numbers. When 50 is subtracted from each of these number the sum of the numbers so obtained is – 10. When 46 is subtracted from each of the original n numbers, then the sum of numbers. So obtained is 70. What is the mean of the original n numbers? **July – 2021**

(a) 56.8 (b) 25.7 (c) 49.5 (d) 53.8

Answer:

(c) Here total No. of observations (N) = n

$\sum(x_i - 50) = -10$

$\sum x_i - \sum 50 = -10$

$n\bar{x} - 50n = -10$ _____(i)

$[\because \sum x_i = n\bar{x}]$

and $\sum(x_i - 46) = 70$

$\sum x_i - \sum 46 = 70$

$n\bar{x} - 46n = 70$ _____(2)

eq (2)_____ eq(1)

$n\bar{x} - 46n = 70$

$n\bar{x} - 50n = -10$

\- + +

$4n = 80$

$n = 20$

n = 20 in eq (1)

$20\bar{x} - 50 \times 20 = -10$
$20\bar{x} - 1000 = -10$
$20\bar{x} = -10 + 1000$
$20\bar{x} = 990$
$\bar{x} = \frac{990}{20}$
$\bar{x} = 49.5$

100. The mean of 'n' observation is 'x'. if k is added to each observation, then the new mean is. **July – 2021**

(a) k (b) xk (c) x-k (d) x+k

Answer:

(d) Given Mean of n observation $(\bar{x})$ = x

$\frac{\sum x_i}{n} = x$

$\sum x_i = xn$

$x_1 + x_2 + x_3 + \ldots\ldots\ldots\ldots x_n = nx$ _____(i)

If k is added to each observation then

New $\sum x_i = (x_1 + k) + (x_2 + k) + (x_3 + k) + \ldots\ldots(x_n + k)$

$= (x_1 + x_2 + x_3 + \ldots\ldots x_n) + (k+k+k+\ldots\ldots\text{n term})$

$= nx + nk$

New Mean $= \frac{New \sum x_i}{n}$

$= \frac{nx+nk}{n}$

$= \frac{\cancel{n}(x+k)}{\cancel{n}}$

$= (x+k)$

101. If y = 3 + 1.9x, and mode of x is 15, then the mode of y is: **July – 2021**

(a) 15.9 (b) 27.8 (c) 35.7 (d) 31.5

Answer:

(d) if y = 3 + 1.9x

then mode of y = 3 + 1.9 (mode of x)

$= 3 + 1.9 \times 15$

$= 3 + 28.5$

$= 31.5$

102. Expenditures of a company (in million rupees) per item in various years **July – 2021**

Year	Item of expenditures				
	Salary	Fuel and Transport	Bonus	Interest on Loans	Taxes
1998	288	98	3.00	23.4	83
1999	342	112	2.52	32.5	108
2000	324	108	3.84	41.6	74
2001	336	133	3.68	36.4	88
2002	420	142	3.96	49.4	98

What is the average amount of interest per which the company had to pay during this period?

(a) 33.66 (b) 36.66 (c) 31.66 (d) 39.66

Answer:

(b) Average Interest $= \frac{23.4+32.5+41.6+36.4+49.4}{5}$

$= 36.66$

103. If there are 3 observations 15, 20, 25 then the sum of deviation of the observations from their AM is **Dec 2021**

(a) 0 (b) 5 (c) -5 (d) 10

104. If the AM and GM for 10 observations are both 15, then the value of HM is **Dec 2021**

(a) less than 15 (b) more than 15

(c) 15 (d) cannot be determined

105. If average mark for a group of 30 girls is 80, a group of boys is 70 and combined average is

76, then how many are in the boy's group **Dec 2021**

(a) 21 (b) 20 (c) 22 (d) 19

Answer:

(b) We have $n_1 = 30$; $\bar{x}_1 = 80$; $n_2 = ?$; $\bar{x}_2 = 70$; $= \bar{x} = 76$

We know that $\bar{x} = \frac{n_1\bar{x}_1+n_2\bar{x}_2}{n_1+n_2}$

Therefore, $76 = \frac{(30\times80)+(n_2\times70)}{30+n_2}$

Now, try the options.

Option (a) → 21

R.H.S. $= \frac{(30\times80)+(21\times70)}{30+21} = 75.88 \neq 76$

Option (b) → 20

R.H.S $= \frac{(30\times80)+(20\times70)}{30+20} = 76 =$ L.H.S.

106. If two variables a and b are related by c = ab then G.M. of c is equal to

(a) G>M> of a + G.M. of b (b) G.M. of a × G.M. of b

(c) G.M. of a – G.M. of b (d) G.M. of a / G.M. of b

107. For a moderately skewed distribution the median is twice the mean, then the mode is _____times the median. **Dec 2021**

(a) 3 (b) 2 (c) 2/3 (d) 3/2

Answer:

(b) We know that for a moderately skewed distribution.

Mode = 3 Median – 2 Mean …Eq. (1)

Given: Median = 2 Mean

Therefore, Mean = $\frac{Median}{2}$

Putting the value of Mean = $\frac{Median}{2}$ in Eq. (1), we get:

Mode = 3 Median - $2\left(\frac{Median}{2}\right)$

Mode = 3 Median – Median = 2 Median

Therefore, Mode is two times of Median.

108. The median value of the set of observations 48, 36, 72, 87, 19, 66 56, 91 is **Dec 2021**

(a) 53 (b) 87 (c) 61 (d) 19

Answer:

(c) First, arrange the terms in ascending order:

19, 36, 48, 56, 66, 72, 87, 91

Since the number of terms is even, i.e. , 8, the median will be obtained by the average of the two

middle terms, i.e., 56, and 66.

Therefore, Median= $\frac{56+66}{2} = 61$

109. One hundred participant expressed their opinion on recommending a new product to their friends using the attributes : most unlikely, not sure, likely, most likely. The appropriate measure of central tendency that can be used here is **Dec 2021**

(a) Mean (b) Mode (c) Geometric mean (d) Harmonic mean

110. Along a road there are 5 buildings of apartments, marked as 1, 2, 3, 4, 5. Number of people residing in each building is available. A bus stop is to be setup near one of the buildings so that the total distance walked by the residents to the bus stop from their buildings must be kept minimum. One must consider involving _____to find the position of the bus stop. **Dec 2021**

(a) Mean (b) Median (c) Mode (d) Weighted mean

111. Given that Mean = 70.20 and Mode = 70.50, the Median is expected to be. **Dec 2021**

(a) 70.15 (b) 70.20 (c) 70.30 (d) 70.35

Answer:

(c) Since Mean and Mode are different, this data is clearly not symmetric.

For moderately skewed data, we know that Mode = 3 Median – 2 Mean.

Therefore, Median = $\frac{Mode+2\,Mean}{3}$

Median = $\frac{70.50+(2\times70.20)}{3}$ = 70.30

112. Which is not a measure of central tendency **June 2022**

(a) Mean (b) Median (c) Quartile deviation (d) Mode

113. When each value does not have equal importance then **June 2022**

(a) A M (b) G M (c) H M (d) Weighted Average

114. The mean of 20 observation is 38. If two observation are taken as 84 and 36 instead of 48 and 63 find new means. **June 2022**

(a) 38. 45 (b) 41.15 (c) 37.55 (d) 40.05

115. The 3rd decile for the numbers **June 2022**

15, 10, 20, 25, 18, 11, 9, 12 is

(a) 13 (b) 10.70 (c) 11.00 (d) 11.50

Answer:

(b) Write the terms in Ascending order 9, 10, 11, 12, 15, 18, 20, 25

Here N = 8

$D_3 = \left[\frac{3(N+1)}{10}\right]^{th}$

$= \left[\frac{3(8+1)}{10}\right]^{th}$

$= \left[\frac{27}{10}\right]^{th}$

$= 2.70^{th}$ term

= 2^{th} term + 0.70(3^{th} term – 2^{th} term)

= 10 + 0.70(11- 10)

= 10 + 0.70 × 1

= 10 + 0.70

= 10.70

116. If mean $(\bar{X})$ is = 10 and mode (Z) is = 7, then find out the value of median (M) **Dec 2022**

(a) 9 (b) 17 (c) 3 (d) 4.33

Answer:

(a) Mean$(\bar{x})$ = 10, Mode(z) = 7, Median(Me) = ?

We know that:

Mode = 3 median – 2 mean

7 = 3 × Me - 2×10

7 +20 = 3Me

Me = $\frac{27}{3}$ = 9

Me = 9

117. The relationship between two variables x and y is given by 4x – 10y = 20. If the median value of the variable x is 10 then what is median value of variable y? **Dec 2022**

(a) 1.0 (b) 2.0 (c) 3.0 (d) 4.0

118. Mean deviation is minimum when deviations are taken from **Dec 2022**

(a) Mean (b) Median (c) Mode (d) Range

119. The median of the observations 42, 72, 35, 92, 67, 85, 72, 81, 51, 56 **Dec 2022**

(a) 69.5 (b) 72 (c) 64 (d) 61.5

Answer:

(a) Write all conservations in Ascending order

35, 42, 51, 56, 67. 72, 72, 81, 85, 92

Here, No. of observation (N) = 10

Median (Me) = Average of two middle term

= $\left(\frac{67+72}{2}\right)$

= $\frac{139}{2}$

= 69.5

120. The mean of 50 observations is 36. If two observations 30 and 42 are to be excluded, then the

mean of the remaining observations will be: **Dec 2022**

(a) 36 (b) 38 (c) 48 (d) 50

Answer:

(a) The mean of 50 observations = 36

The sum of all observations = 50 × 36

= 1800

If two observations 30 and 42 are excluded then the sum of remaining (50 – 2 = 48) observations

= 1800 – 30 – 42

= 1728

The mean of 48 observations = $\frac{1728}{48}$

= 36

121. If Arithmetic Mean and Geometric Mean between two numbers are 5 and 4 respectively, then these numbers are: **Dec 2022**

(a) 2 & 3 (b) 2 & 8 (c) 4 & 6 (d) 1 & 16

Answer:

(b) Here, A.M. = 5 and G.M. = 4

HINTS/TRIALS (B) Two observations are 2 and 8

A.M. = $\frac{a+b}{2}$ = $\frac{2+8}{2}$ = 5

G.M. = $\sqrt{ab}$ = $\sqrt{2 \times 8}$ = $\sqrt{16}$ = 4

So, these nos. are 2 and 8.

122. If AM between two numbers is 5 and GM is 4 then what is the value of HM? **Dec 2022**

(a) 3.2 (b) 3.4 (c) 3.5 (d) 3.6

Answer:

(a) Given : A.M = 5, G.M = 4, H.M = ?

H.M. = $\frac{(G.M)^2}{(A.M)} = \frac{(4)^2}{5} = \frac{16}{5} = 3.2$

123. The average age of 15 students in a class is 9 years. Out of them, average age of 5 students is 13 years and that 8 students is 5 years. What is average of remaining 2 students? **Dec 2022**

(a) 5 years (b) 9 years (c) 10 years (d) 15 years

. Answer:

(c) Total student = 15 ($\bar{x}$ = 9 years)

n_1= 5 n_2= 8 n_3 =(15- 5-8) = 2

$\bar{x}_1$ = 13 years $\bar{x}_2$ = 5 years $\bar{x}_3$ = x

Combined mean ($\bar{x}$) = $\frac{n_1\bar{x}_1+n_2\bar{x}_2+n_3\bar{x}_3}{n_1+n_2+n_3}$

$9 = \frac{5\times13+8\times5+2\times x}{5+8+2}$

$\frac{9}{1} = \frac{65+40+2x}{15}$

135 = 105 + 2x

2x = 30

x = 15 years

The average of remaining 2 students = 15 years

124. A Professor has given assignment to students in a statistics class . A student computer the arithmetic mean and standard deviation for 100 students as 50 and 5 respectively . Later on She paints out the student that he has made mistake in taking one observation as 100 instead of 50 . What would be the consent mean if the wrong observation is correct ? June 2023

(a) 50.5 (b) 49.9 (c) 49.5 (d) 50.1

Answer :

(c) Incorrect Mean ($\bar{x}$) = 50

Incorrect (S.D) = 5

No. of observation (N) = 100

Right Value (R.V) = 50
Wrong Value (W.V) = 100

$$\text{Correct Mean } (\bar{x})_c = \text{Incorrect mean} + \left(\frac{RV-WV}{N}\right)$$
$$= 50 + \left(\frac{50-100}{100}\right)$$
$$= 50 + \left(\frac{-50}{100}\right)$$
$$= 50 - 0.5$$
$$= 49.5$$

125. Find the mean of the following date

Class interval	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	9	13	6	4	6	2	3

June 2023

(a) 23.7 (b) 35.7 (c) 39.7 (d) 43.7

Answer :

(b)

C.I	Frequency(f)	Mid Value (x)	f × x
10 – 20	9	15	135
20 – 30	13	25	325
30 – 40	6	35	210
40 – 50	4	45	180
50 – 60	6	55	330
60 – 70	2	65	130
70 – 80	3	75	225
	N=43		fx=1535

$$\text{Mean } (\bar{x}) = \frac{\sum fx}{N} = \frac{1535}{43} = 35.7$$

126. For a moderately skewed distribution of master is statistics is for a group is for a group of 200 students, the mean and median marks were found to be 55.60 and 52.40 respectively . What are the model makes? June 2023

(a) 54.43 (b) 48 (c) 53.56 (d) 46

Answer :

(d) Given Mean = 55.60
Median = 52.40
Mode = 3 Median – 2 Mean
= 3 × 52.40 – 2 × 55.60
= 157.20 – 11.20
= 46

127. The geometric mean of 3,7,11,15,24,28,30,0 is : June 2023

(a) 6 (b) 0 (c) 9 (d) 12

Answer :

(b) G.M = $(X_1.X_2.X_3.X_4.....X_n)^{1/n}$
$= (3 \times 7 \times 11 \times 15 \times 24 \times 28 \times 30 \times 0)^{1/8}$
$=(0)^{1/8}$
= 0

128. The median of the following set of observation 24, 18, 36, 42, 30,28, 21, 20, 25, 33, 18 June 2023

(a) 26.5 (b) 27.5 (c) 28.5 (d) 29.5

Answer:

(a) Write the terms in Ascending order

18, 20, 21, 24, 25, 28, 30, 33, 36, 42
Here, No. of observation (N) = 10

$$\text{Median } (M_e) = \left(\frac{N+1}{2}\right)^{m} \text{ term}$$
$$= \left(\frac{10+1}{2}\right)^{m} \text{ term}$$
$$= 5.5^{M} \text{ term}$$
$$= \left(\frac{5^{m}\text{term}+6^{m}\text{term}}{2}\right)$$
$$= \left(\frac{25+28}{2}\right)$$
$$= 26.5$$

129. Find the mode of the following data

X	25-30	30-35	35-40	40-45	45-50	50-55
F(x)	20	53	51	51	41	53

June 2023

(a) 31.75 (b) 30.75 (c) 33.75 (d) 35.75

Answer:

(c)

x:	25-30	30-35	35-40	40-45	45-50	50-55
f:	20	53	51	51	41	53

Here Model Class are '30-35'
So mode lies from '30-35'

Mode = 33.75

130. For the given data set : 5,10,3,6,4,8,9,3,15,2,9,4,19,11,4, what is the median . June 2023

(a) 8 (b) 6 (c) 4 (d) 9

Answer:

(b) Write all observations in ascending order
2,3,3,4,4,4,5,6,8,9,9,10,11,15,19
Here N = 15

$$\text{Median } (M_\theta) = \left(\frac{N+1}{2}\right)^{th} \text{ term}$$
$$= \left(\frac{15+1}{2}\right)^{th} \text{ term}$$
$$= 8^{th}\text{term}$$
$$= 6$$

131. If the mean of two number is 30 and geometric mean is 24 , then what will be Harmonic mean of two numbers? June 2023

(a) 19.2 (b) 21.8 (c) 22.3 (d) 18.4

Answer :

(a) Here mean = 30, Geometric mean = 24
Or A.M = 30,G.M = 24 , H.M = ?

$$G.M^2 = A.M \times H.M$$
$$(24)^2 = 30 \times H.M$$
$$576 = 30 \times H.M$$
$$H.M = \frac{576}{30} = 19.2$$

132. The AM and HM of two numbers are 5 and 3.2 respectively, then GM will be : dec 2023

(a) 4.4 (b) 4.2 (c) 4.0 (d) 3.8

Answer :

(c) Here , A.M =5 , H.M = 3.2 , G.M = ?
We know that ,

$$(G.M)^2 = A.M \times H.M$$
$$= 5 \times 3.2$$
$$(G.M)^2 = 16$$
$$G.M = \sqrt{16} = 4$$

133. If mode of a grouped data is 10 and median is 6, then what is the value of mean ? dec 2023

(a) 2 (b) 4 (c) 6 (d) 8

Answer :

(b) Here , Mode = 10 , Median = 6 , Mean = ?

Mode = 3 Median – 2 Mean

10 = 3 × 6 – 2 × Mean

10 = 18 – 2 Mean

2 Mean = 18 – 10

2 Mean = 8

Mean = 8

Mean = $\frac{8}{2} = 4$

134. If mean of 5 observations x+1, x+3, x+5, x+7, and x+9 is given 15, then the value of x will be : dec 2023

(a) 10 (b) 12 (c) 8 (d) 11

Answer :

(a) Mean (x) = $\frac{\Sigma x}{N}$

$15 = \frac{X+1+X+3+X+5+X+7+X+9}{5}$

75 = 5x + 25

5x = 75 – 25

5x = 50

$\boxed{X = 10}$

135. The mean of the first three terms is 17 and mean of next four terms is 21. Calculate the mean of seven terms. dec 2023

(a) 18.28 (b) 19.78 (c) 19.58 (d) 19.28

Answer :

(d) Here $n_1 = 3$, $n_2 = 4$

$\overline{x_1} = 17$, $\overline{x_2} = 21$

Combined mean of 7 terms.

$\overline{x} = \frac{n_1\overline{x_1}+n_2\overline{x_2}}{n_1+n_2}$

$= \frac{3\times17+4\times21}{3+4}$

$= \frac{51+84}{7}$

$= \frac{135}{7}$

$\overline{x} = 19.28$

136. The mean of set of 20 observations in 18.3.The mean is reduced by 0.6 when a new observation is : dec 2023

(a) 17.6 (b) 18.9 (c) 5.7 (d) 24.6

Answer:

(c) ∵ The mean of 20 observations = 18.3

The sum of 20 ovservations = 18.3 × 20

= 366

Let new observation = x

If the new observation is added then

sum of all observations = (366 + x)

and No. of all observations = 20 + 1 = 21

New mean = 18.3 – 0.6 = 17.7

New mean = $\frac{(366+x)}{21}$

$17.7 \times \frac{(366+x)}{21}$

371.7 = 366 + x

x = 371.7 – 366

x = 5.7

137. If A.M. and G.M of two positive numbers a and b are 12 and 12, respectively, find the numbers. dec 2023

(a) 18 and 6 (b) 15 and 9 (c) 16 and 8 (d) 12 and 12

Answer:

(d) Given, A.M. = 12

$\frac{a+b}{2} = 12$

$a + b = 24$ ……..(1)

and G.M. = 12

$\sqrt{ab} = 12$

$ab = 144$ ……(2)

By Hits and trails option 'D′ 12 and 12

Satisfied both equation.

138. If the range of a data is 20 and its smallest value is 5, then what is the largest value of data is ? dec 2023

(a) 20 (b) 25 (c) 5 (d) 30

Answer:

(b) Range (R) Largest Value – Smallest Value

20 = Largest value – 5

Largest value = 20 + 5

= 25

139. The Median of the following frequency distribution is: dec 2023

x	0-10	10-20	20-30	30-40	40-50
f(x)	3	5	20	12	7

(a) 27.75 (b) 9.35 (c) 8.25 (d)10.01

Answer:

(a)

x	f	C.F.
0 – 10	3	3
10 – 20	5	8 → c
20 – 30	20 → f	28
30 – 40	12	40
40 – 50	7	47
	N = 27	

Here, $m = \frac{N}{2} = \frac{47}{2} = 23.5$

Median = $L1 + \frac{L2-L1}{f}(m - c)$

$= 20 + \frac{30-20}{20}(23.5 - 8)$

$= 20 + \frac{10}{20} \times 15.5$

$= 20 + \frac{155}{20}$

$= 20 + 7.75$

$= 27.75$

140. If two, variable 'x' and 'y' are related as 2x-y=3, if the median of 'x' is 10, what is median of 'y' ? dec 2023

(a) 4 (b) 17 (c) 5 (d) 6

Answer:

(b) Given, $2x - y = 3$

Median of x = 10
$2 \times 10 - y = 3$
$20 - y = 3$
$y = 20 - 3$

$\boxed{y = 17}$

141. If the mean and median of a moderately asymmetrical series are 26.8 and 27.9 respectively, then the most probable mode is: dec 2023
(a) 35.4 (b) 30.1 (c) 34.3 (d) 70 .8

Answer:

(b) Mode = 3 Median – 2 Mean
$= 3 \times 27.9 - 2 \times 26.8$
$= 83.7 - 53.6$
$= 30.1$

Answer Key

1.	b	2.	c	3.	d	4.	d	5.	a	6.	d	7.	c	8.	d	9.	b	10.	c
11.	a	12.	c	13.	a	14.	a	15.	d	16.	a	17.	a	18.	b	19.	b	20.	a
21.	b	22.	b	23.	a	24.	b	25.	b	26.	c	27.	b	28.	c	29.	a	30.	d
31.	c	32.	d	33.	b	34.	c	35.	b	36.	c	37.	b	38.	a	39.	a	40.	a
41.	a	42.	a	43.	c	44.	d	45.	b	46.	a	47.	c	48.	c	49.	c	50.	c
51.	c	52.	b	53.	c	54.	d	55.	b	56.	a	57.	a	58.	c	59.	b	60.	c
61.	a	62.	b	63.	c	64.	b	65.	a	66.	d	67.	a	68.	b	69.	a	70.	c
71.	b	72.	a	73.	c	74.	a	75.	a	76.	b	77.	a	78.	a	79.	a	80.	c
81.	b	82.	c	83.	a	84.	b	85.	b	86.	d	87.	c	88.	a	89.	a	90.	b
91.	b	92.	b	93.	d	94.	a	95.	c	96.	d	97.	d	98.	d	99.	c	100.	d
101.	d	102.	b	103.	a	104.	c	105.	b	106.	b	107.	b	108.	c	109.	b	110.	b
111.	c	112.	c	113.	d	114.	c	115.	b	116.	a	117.	b	118.	b	119.	a	120.	a
121.	b	122.	a	123.	d													

CHAPTER
MEASURES OF DISPERSION

PAST YEAR QUESTIONS

1. A student obtained the mean and standard deviation of 100 observations as 40 and 5.1 respectively. It was later discovered that he had wrongly copied down an observation as 50 instead of 40. The correct standard deviation is : **Nov-2006**

(a) 5 (b) 6 (c) 3 (d) 7

2. If two samples of sizes 30 and 20 have means as 55 and 60 and variances as 16 and 25 respectively, then what would be the S. d. of the combined sample size 50? **Feb-2007**

(a) 5.33 (b) 5.17 (c) 5.06 (d) 5

3. If two variables x and y are related 2x + 3y - 7 = 0 and the mean and mean deviation about mean of x are 1 and 0.3 respectively, then the co-efficient of mean deviation of y about mean is: **Feb-2007**

(a) -5 (b) 4 (c) 12 (d) 50

4. Measures of dispersion are called averages of the _____ order: **May-2007**

(a) 1st (b) 2nd (c) 3rd (d) None

5. **For a set of 100 observations, taking assumed mean as 4, the sum of the deviations is -11 cm, and the sum of the squares of these deviations is 257 cm^2. The coefficient of variation is : May-2007**

(a) 41.13% (b) 42.13% (c) 40.13% (d) None

Solution :

For 100 observation n = 100 Assumed means 4 Sum of deviation is – 11

$\sum(x-4)=-11$ Sum of squares of deviation is 257 cm^2

$\sum(x-4)^2=257$

For C.V. (I need SD & mean)

$\sum(x-4)=-11$

$\sum x-\sum 4=-11$

$\sum x-n\times 4=-11$

$\sum x-100\times 4=-11$

$\sum x=389$

$\sum(x\pm y)=\Sigma x\pm\Sigma y$

$\sum kx=k\Sigma x$

$\sum k=nk$

Now, $\sum(x-4)^2=\sum(x^2-8x+16)$ $=\sum x^2-\sum 8x+\sum 16$

$257=\Sigma x^2-8\Sigma x+n\times 16$ $257=\Sigma x^2-8\times 389+100\times 16$ $\Sigma x^2=1769$

Mean $=\frac{\Sigma x}{n}=\frac{389}{100}=3.89$

SD $=\sqrt{\frac{\Sigma x^2}{n}-\left(\bar{x}\right)^2}=\sqrt{\frac{1769}{100}-(3.89)^2}$

$=1.59$

CV $=\frac{SD}{Mean}\times 100=\frac{1.59}{3.89}\times 100=41.13\%$

6. Which of the following companies A or B is more consistent so far as the payment of dividend is concerned ? **Aug-2007**

Dividend paid by A:	5	9	6	12	15	10	8	10
Dividend paid by B:	4	8	7	15	18	9	6	6

(a) A (b) B (c) Both A & B (d) Neither A nor B

7. What is the coefficient of range for the following distribution? **Aug-2007**

Class Interval:	10-19	20-29	30-39	40-49	50-59
Frequency:	11	25	16	7	3

(a) 22 (b) 50 (c) 75.82 (d) 72.46

8. A sample of 35 observations has the mean 80 and S.D. as 4. A second sample of 65 observations from the same population has mean 70 and S.D. 3. The S.D. of the combined sample is : **May-2007**

(a) 5.85 (b) 5.58 (c) 10.23 (d) None of these

9. If x and y are related as 3x - 4y = 20 and the quartile deviation of x is 12, then the quartile deviation of y is : **May-2007**

(a) 14 (b) 15 (c) 16 (d) 9

10. The best measure of dispersion is: **Feb-2008**

(a) Q.D. (b) M.D. (c) Range (d) S.D.

11. If the mean and S.D. of x are a and b respectively, then the S.D. of $\frac{x-a}{b}$ is: **Feb-2008**

(a) a/b (b) -1 (c) 1 (d) ab

12. Suppose a population A has 100 observations 101, 102, 103, …… 200 and another population B has 100 observations 151, 152, 153, ….. 250. If V_A and V_B represents the variance of the two populations respectively, then V_A / V_B = : **Feb-2008**

(a) 9/4 (b) 1 (c) 4/9 (d) 2/3

13. The Mean and S.D. for group of 100 observations are 65 and 7.03 respectively If 60 of these observations have mean and S.D. as 70 and 3 respectively, what is the S.D. for the group comprising 40 observations? **June-2008**

(a) 2.03 (b) 4.03 (c) 8.03 (d) 9:33

14. The quartile deviation for the data is : **June-2008**

x :	2	3	4	5	6
f :	3	4	8	4	1

(a) ¼ (b) ½ (c) 0.875 (d) 0

15. If X and Y are two random variables then v (x + y) is : **Dec-2008**

(a) v (x) + v (y) (b) v (x) + v (y) – 2v (x, y)

(c) v (x) + v (y) + 2v (x, y) (d) v (x) – v (y)

16. Mean and S. D. of x is 50 and 5 respectively. Find mean and S.D. of $\frac{x-50}{5}$ **Dec-2008**

(a) (1,0) (b) (0, 1) (c) (1,:) (d) (0,-1)

17. Mean and S. D. of a given set of is 1,500 and 400 respectively. If there is an increment of 100 in the first year and each observation is hiked by 20% in 2nd years, then find new mean and S. D. **Dec-2008**

(a) 1920, 480 (b) 1920, 580 (c) 1600, 480 (d) 1600, 400

If 5 is subtracted from each observation of some certain item then its co-efficient of variation is 10% and if 5 is added to each item then its coefficient of variation is 6%. Find original coefficient of variation **Dec-2008**

(a) 8% (b) 7.5% (c) 4% (d) None of these

18. Inter Quartile Range is _____ of Quartile Deviation. **June-2009**

(a) Half (b) Double (c) Triple (d) Equal

Answer:

(b) Quartile Deviation or Semi – inter quartile Range = $\frac{Q_3-Q_1}{2}$

Inter –quartile Range = $Q_3 - Q_1$

Therefore, inter-quartile range is double of quartile deviation. In other words, quartile deviation is half of inter- quartile range.

19. The sum of squares of deviation from mean of 10 observations is 250. Mean of the data is 10. Find the co-efficient of variation. **June-2009**

(a) 10% (b) 25% (c) 50 % (d) 0%

Answer:

(c) S.D. = $\sqrt{\frac{\sum(x-\bar{x})^2}{N}}$

In the given data, $\sum(x-\bar{x})^2 = 250$

N = 10
Mean = 10

Therefore, S.D/= $\sqrt{\frac{250}{10}}$

S.D. = 5

So, coefficient of variation = $\frac{S.D.}{Mean} \times 100 = \frac{5}{10} \times 100 = 50\%$

20. If L_1 = highest observation and L_2 = smallest observation, then Coefficient of Range = **Dec-2009**

(a) $\frac{L_1 \times L_2}{L_1/L_2} \times 100$ (b) $\frac{L_1 - L_2}{L_1 + L_2} \times 100$ (c) $\frac{L_1 + L_2}{L_1 - L_2} \times 100$ (d) $\frac{L_1/L_2}{L_1 \times L_2} \times 100$

Answer:

(b) Coefficient of Range = $\frac{highest\ observation - samllest\ observation}{highest\ observation + samllest\ observation}$

$= \frac{L_1 - L_2}{L_1 + L_2} \times 100$

21. The equation of a line is 5x + 2y = 17. Mean deviation of y about mean is 5. Calculate mean deviation of x about mean. **Dec-2009**

(a) – 2 (b) 2 (c) – 4 (d) Norte

Answer:

(b) 5x + 2y = 17

x = $-\frac{2y}{5} + \frac{17}{5}$

M.D. of x = b × M.D. of y.

$= \left[-\frac{2y}{5}\right] \times 5$

$= \frac{2}{5} \times 5$

= 2

22. If variance of x is 5, then find the variance of (2 – 3x) **Dec-2009**

(a) 10 (b) 45 (c) 5 (d) -13

Solution :

Variance of x = 5 $SD = \sqrt{5}$

Let 4 = 2 – 3x

SD of 4 3 × SD of x = 3 × $\sqrt{5}$ Variance = $\left(3\sqrt{5}\right)^2$ = 45

23. The variance of data : 3,4,5,8 is **Dec-2010**

(a) 4.5 (b) 3.5 (c) 5.5 (d) 6.5

Answer:

(b) 3, 4 , 5, 8

Variance = $\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2$

$= \frac{114}{4} - 25$

$= \frac{114 - 100}{4} = \frac{14}{4}$

$= \frac{7}{2}$

= 3.5

24. Given the observations : 4,9,11,14,37. The Mean deviation about the Median is **Dec-2010**

(a) 11 (b) 8.5 (c) 7.6 (d) 7.45

Answer:

(c) 4, 9, 11, 14 , 37

Median = $\left(\frac{n+1}{2}\right)^{th}$ term

$= \left(\frac{5+1}{2}\right)^{th}$ term

= 3rd term

= 11

x [d] = [x-11]

4	7
9	2
11	0
14	3
37	26
	38

Mean deviation about median

M.D. = $\frac{\sum[d]}{n} = \frac{38}{5} = 7.6$

25. If all observations in a distribution are increased by 6, then the variance of the series will be **June-2010**

(a) Increased (b) Decreased (c) Unchanged (d) None of these.

26. The standard deviation of the weights (in kg) of the students of a class of 50 students was calculated to be 4.5 kg. Later on it was found that due to some fault in weighing machine, the weight of each student was under measured by 0.5 kg. The correct standard deviation of the weight will be: **Dec-2011**

a) Less than 4.5 b) Greater than 4.5

c) Equal to 4.5 d) Can not be determined

Solution : 55

SD not affect = 4.5 Kg.

27. For Normal distribution the relation between deviation (S.D) is **Dec-2011**

a) Q.D > S.D b) Q.D < S.D c) Q.D = S.D d) None of the above

Answer:

(b) We know Q.D = $\frac{2}{3}$ S.D

=> Q.D < S.D.

28. If standard deviation of first 'n' natural numbers is 2 then value of 'n' is **June-2012**

(a) 10 (b) 7 (c) 6 (d) 5

Answer:

(b) S.D. of First 'n' natural Numbers = $\sqrt{\frac{n^2-1}{12}}$

$\frac{2}{1} = \sqrt{\frac{n^2-1}{12}}$

$4 = \frac{n^2-1}{12}$

$n^2 - 1 = 48$

$n^2 = 49$ => n = 7

29. The standard deviation is independent of change of **June-2012**

(a) Scale (b) Origin (c) Both origin and scale (d) None of these.

Answer:

(b) We know,

S.D = $\sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2} = \sqrt{\frac{\sum d^2}{n} - \left(\frac{\sum d}{n}\right)^2}$

Where d = x – A

A = Assumed mean

Comparing above both the formula's , we immediately conclude that S.D. is independent of change of origin.

30. If Standard deviation of x is σ, then Standard deviation of $\left(\frac{ax+b}{c}\right)$, where a, b and c (c ± 0) are arbitrary constants, will be **Dec-2012**

(a) σ (b) $\frac{a\sigma+b}{c}$ (c) $\frac{a}{c}.\sigma$ (d) $\left|\frac{a}{c}\right| \sigma$

Answer :

(d) ∵ S.D. of x = σ

Let y = $\frac{ax+b}{c}$

$$y = \frac{ax}{c} + \frac{b}{c}$$

$$y = \frac{b}{c} + \frac{a}{c}x$$

S.D. of $y = [\frac{a}{c}]$ S.D. of x

$= [\frac{a}{c}]\sigma$

31. Which of the following measures of dispersion is used for calculating the consistency between two series? **Dec-2012**

(a) Quartile deviation (b) Standard Deviation

(c) Coefficient of variation (d) None of the above

32. If sum of squares of the values = 3390, N = 30 and standard deviation = 7, find out mean. **June-2013**

a) 113 b) 210 c) 8 d) None of these

Answer:

(c) S.D. = 7, $\sum d^2 = 3390$, N = 30

we know that find $\bar{x}$ = ?

$$\text{S.D.} = \sqrt{\frac{\sum d^2}{n} - (\bar{x})^2}$$

$$7 = \sqrt{\frac{3390}{30} - (\bar{x})^2}$$

on squaring

$$49 = \frac{3390}{30} - (\bar{x})^2$$

$$49 = 113 - (\bar{x})^2$$

$$(\bar{x})^2 = 113 - 49$$

$$(\bar{x})^2 = 64$$

$$\bar{x} = \sqrt{64}$$

$$= 8$$

33. If the mean of a frequency distribution is 100 and coefficient of variation is 45% then standard deviation is: **June-2013**

a) 45 b) 0.45 c) 4.5 d) 450

Answer:

(a) Given Mean $\bar{x}$ = 100

Coeff. of variation (C.V.) = 45%

$$\text{C.V.} = \frac{S.D.}{A.M.} \times 100$$

$$45 = \frac{S.D.}{100} \times 100$$

S.D. = 45

34. Find the variance given that the Arithmetic Mean = (8 + 4)/2 **Dec-2013**

(a) 2 (b) 6 (c) 1 (d) 4

Answer:

(d) Given Arithmetic Mean = $\frac{(8+4)}{2}$

Here Largest value (L) = 8

Smallest values (S) = 4

Range = L – S

= 8 – 4

= 4

we know that

$$\text{S.D} = \frac{Range}{2}$$

$$\text{S.D} = \frac{4}{2} = 2$$

Variance = $(\text{S. D})^2 = (2)^2 = 4$

35. Coefficient of mean deviation about mean for the first 9 natural numbers is. **Dec-2013**

(a) 200/9 (b) 80 (c) 400/9 (d) 50.

Answer:

(c) The First 9 natural Number are 1, 2, 3, 4, 5, 6, 7, 8, 9

Mean $\bar{x} = \frac{\sum x}{N} = \left(\frac{1+2+3+4+5+6+7+8+9}{9}\right) = \frac{45}{9} = 5$

x	$\bar{x}$	[d] = [x - $\bar{x}$]
1	5	[1-5] = - 4
2	5	[2-5] = -3
3	5	[3-5] = -2
4	5	[4-5] = -1
5	5	[5-5] = 0
6	5	[6-5] = 1
7	5	[7-5] = 2
8	5	[8-5] = 3
9	5	[9-5] = 4
N = 9		$\sum[d]$ = 20

Mean Deviation

M.D. $= \frac{\sum[d]}{N} = \frac{20}{9}$

Coeff of M.D $= \frac{\text{M.D.}}{Mean} \times 100$

$= \frac{\frac{20}{9}\times 100}{5}$

$= \frac{20\times 100}{9\times 5} = \frac{400}{9}$

36. If mean = 5, Standard deviation = 2.6, median = 5 and quartile deviation = 1.5, then the coefficient of quartile deviation equals? **Dec-2013**

(a) 35 (b) 39 (c) 30 (d) 32.

Answer:

(c) Given

Mean $\bar{x}$ = 5 , S.D. (σ) = 2.6, Median = 5 and Q.D. = 1.5

Coeff of Q.D. $= \frac{Q_3-Q_1}{Q_3+Q_1} \times 100$

$= \frac{\left(\frac{Q_3-Q_1}{2}\right)}{\left(\frac{Q_3+Q_1}{2}\right)} \times 100$

$= \frac{Q.D.}{Median} \times 100$

$= \frac{1.5}{5} \times 100$

$= \frac{150}{5}$

$= 30$

37. What will be the probable value of mean deviation? when Q_3 =40 and Q_1 =15 **June-2014**

a) 17.50 b) 18.75 c) 15.00 d) None of the above

Answer:

(c) Q_3 = 40 and Q_1 = 15

Q. D. $= \frac{Q_3-Q_1}{2} = \frac{40-15}{2} = \frac{25}{2} = 12.50$

5 M.D. = 6 Q.D. => M.D. $= \frac{6}{5}$ Q.D.

$= \frac{6}{5} \times 12.50 = 15$

38. The formula for range of middle 50% items of a series is : **June-2014**

a) $Q_3 - Q_1$ b) $Q_3 - Q_2$ c) $Q_2 - Q_1$ d) $\frac{Q_3-Q_1}{2}$

Answer:

(d) The formula for Range of middle 50% items of a series is (Q.D.). Q.D.= $\frac{Q_3-Q_1}{2}$

39. If the first quartile is 142 and semi-inter quartile range is 18, then the value of median is : **Dec-2014**

a) 151 b) 160 c) 178 d) None of these

Answer:

(b) First Quartile $Q_1 = 142$

Semi Inter quartile range (Q.D.) = 18

$$\frac{Q_3 - Q_1}{2} = 18$$

$$Q_3 - Q_1 = 36$$

$$Q_3 - 142 = 36$$

$$Q_3 = 36 + 142$$

Third Quartile $Q_3 = 178$

$$\text{Median} = \frac{Q_3 + Q_1}{2}$$

$$= \frac{142 + 178}{2}$$

$$= \frac{320}{2} = 160$$

40. The quartile deviation is: **Dec-2014**

a) 2/3 S.D b) 4/5 S.D c) 5/6 S.D d) None of these

Answer:

(a) We know that

4 S.D. = 6 Q.D.

then Q.D. = $\frac{4}{6}$ S.D.

$$\boxed{\text{Q.D.} = \frac{2}{3}\text{ S.D.}}$$

41. The standard deviation of a variable x is known to be 10. The standard deviation of 50 + 5x is **Dec-2014**

a) 50 b) 100 c) 10 d) 500

Answer:

(a) S.D. of x = 10

Given y = 50 + 5x

5x – y + 50 = 0

$$b = -\frac{coefficient\ of\ x}{coefficient\ of\ y} = \frac{-5}{-1} = 5$$

S.D. of y = |3| S.D. of x

= |5| × 10

= 5 × 10

= 50

42. Coefficient of quartile deviation is equal to : **June-2015**

a) Quartile deviation × 100/median b) Quartile deviation × 100/mean

c) Quartile deviation × 100/mode d) None

Answer:

(a) Coeff. of Q.D.= $\frac{Q_3 - Q_1}{Q_3 + Q_1} \times 100$

$$= \frac{\frac{Q_3 - Q_1}{2}}{\frac{Q_3 + Q_1}{2}} \times 100$$

$$= \frac{Quartile\ Deviation \times 100}{Median}$$

43. If all the observations are increased by 5, then **June-2015**

a) S.D. would be increased by 5 b) Mean deviation would be increased by 5

c) Quartile deviation would be increased by 5 d) All the three would not be increased by 5

44. What is value of mean deviation about mean from the number 5, 8, 6, 3 and 4 ? : **Dec - 2015**

a) 5.20 b) 7.20 c) 1.44 d) 2.23

Answer:

(c) Given data 3, 4, 5, 6, 8

Mean $\bar{x} = \frac{\sum x}{N} = \frac{3+4+5+6+8}{5} = \frac{26}{5} = 5.2$

x	$\bar{x}$	| d | = | x – $\bar{x}$ |
3	5.2	| 3 – 5.2 | = 2.2
4	5.2	| 4 – 5.2 | = 1.2
5	5.2	| 5 – 5.2 | = 0.2
6	5.2	| 6 – 5.2 | = 0.8
8	5.2	| 8 – 5.2 | = 2.8
N = 5		$\sum \lvert d \rvert$ = 7.2

M.D. $= \frac{\sum[d]}{N} = \frac{7.2}{5} = 1.44$

45. For the observation of 6, 4, 1, 6, 5,10, 4, 8 the range is : **Dec - 2015**

a) 10 b) 9 c) 8 d) None

Answer:

(b) Given data in Ascending Order

1, 4, 4, 5, 6, 6, 8, 10

Largest value (L) = 10

Smallest value (S) = 1

Range (R) = L – S

= 10 – 1

= 9

46. If a variance of a random variable 'x' is 23, then what is variance of 2x + 10? **Dec - 2015**

a) 56 b) 33 c) 46 d) 92

Answer:

(d) Given Variance of x = 23

V(x) = 23

S.D. of x = $\sqrt{23}$

Given y= 2x + 10

2x – y + 10 = 0

b = $-\frac{coefficient\ of\ x}{coefficient\ of\ y} = \frac{-2}{-1} = 2$

S.D. of Y = |b| S.D. of x

= |2|.$\sqrt{23}$

= $2\sqrt{23}$

Variance of y = (S.D. of y)^2 = $(2\sqrt{23})^2$

= $2^2 \times 23$

= 4 × 23

= 92

47. If variance = 148.6 and $\bar{x} = 40$, the coefficient of variation is : **Dec - 2015**

a) 37.15 b) 30.48 c) 33.75 d) None of the above

Answer:

(b) Variance = 148.6

S.D. = $\sqrt{Variance}$

= $\sqrt{148.6}$

= 12.19

And A.M. ($\bar{x}$) = 40

Coefficient of Variation C.V. = $\frac{S.D.}{A.M.} \times 100$

= $\frac{12.19}{40} \times 100$

= 30.48 (Appr.)

48. The SD of first n natural number is _____ : **June-2016**

a) $\sqrt{\frac{n^2-1}{12}}$ b) $\sqrt{\frac{n(n+1)}{12}}$ c) $\frac{2(n-1)}{6}$ d) None of these.

Answer:

(a) The S.D. of First n natural Number is

$$S.D. = \sqrt{\frac{n^2-1}{12}}$$

49. If mean and coefficient of variation of the marks of 10 students is 20 and 80 respectively. What will be variance of them? **June-2016**

a) 256 b) 16 c) 25 d) None of these.

Answer:

(a) Given No. of observation N = 10

Mean $(\bar{x})$ = 20

c.v. = 80

$$c.v. = \frac{S.D.}{A.M.} \times 100$$

$$80 = \frac{S.D.}{20} \times 100$$

$$S.D. = \frac{80 \times 20}{100}$$

$$S.D. = 16$$

$$Variance = (S.D.)^2$$

$$= (16)^2$$

$$= 256$$

50. If same amount is added to or subtracted from all the values of an individual series then the standard deviation and variance both shall be _____ **June-2016**

a) Changed b) Unchanged c) Same d) None of these.

Answer:

(b) If same amount is added to or subtracted from all the values of an individual series then

S.D. and variance both shall be unchanged.

51. The second and third moments of a sample of seven observation (-6,-4,-2,0,2,4,6) are **Dec-2016**

(a) (12,0) (b) (0,12) (c) (0,16) (d) (16,0)

52. For a moderately skewed distribution, the relationship between mean, median and mode is: **Dec-2016**

a) Mean - Mode = 2 (Mean - Median) b) Mean - Median =3 (Mean - Mode)

c) Mean - Median = 2 (Mean - Mode) d) Mean - Mode = 3 (Mean - Median)

53. If arithmetic mean and coefficient of variation of x are 10 and 40. respectively then the variance of $-15 + \frac{3x}{2}$ will be: **Dec - 2016**

a) 64 b) 81 c) 49 d) 36

54. If Arithmetic Mean = $\frac{8+4}{2}$, then Variance is : **Dec-2017**

a) 2 b) 6 c) 1 d) 4

55. Coefficient of mean deviation about mean for the first 9 natural numbers is : **Dec-2017**

a) $\frac{200}{9}$ b) 80 c) $\frac{400}{9}$ d) 50

56. Mean =5, S.D = 2.6, Median = 5, Q.D = 1.5 then Coefficient of Q.D is : **Dec-2017**

a) 35 b) 39 c) 30 d) 32

57. The difference between maximum and minimum value of the data is known as : **Dec-2017**

a) Range b) Size c) Width d) Class

58. $\frac{(Q_3-Q_1)}{(Q_3+Q_1)}$ is known as **May-2018**

(a) Coefficient of Range (b) Coefficient of Q.D.

(c) Coefficient of S.D. (d) Coefficient of M.D.

Answer:

(b) Coefficient of Q.D. = $\frac{(Q_3-Q_1)}{(Q_3+Q_1)}$

59. If the S.D. of the 1st n natural Nos. is $\sqrt{30}$, Then the value of n is **May-2018**

(a) 1 9 (b) 20 (c) 21 (d) None

Answer:

(a) S.D. of First 'n' natural Numbers

$$= \sqrt{\frac{n^2-1}{12}}$$

$$\sqrt{30} = \sqrt{\frac{n^2-1}{12}}$$

On squaring both side

$$30 = \frac{n^2-1}{12}$$

$$360 = n^2 - 1$$

$$n^2 = 360 + 1$$

$$n^2 = 361$$

$$n = \sqrt{361}$$

$$n = 19$$

60. The Algebraic sum of the deviation of a set of values from their arithmetic mean is **Nov-2018**

(a) > 0 (b) = 0 (c) < 0 (d) None of the above

Answer:

(b) The Arithmetic sum of the deviation of a set of value from their A.M is always Zero.

61. If the range of a set of values is 65 and maximum value in the set is 83, then the minimum value in the set is **Nov-2018**

(a) 74 (b) 9 (c) 18 (d) None of the above

Answer:

(c) Given : Maximum Value (L) = 83

Range (R) = 65

Minimum Value (S) = ?

Range (R) = L – S

$65 = 83 - S$

$S = 83 - 65$

$S = 18$

62. If the variance of 5, 7, 9 and 11 is 4, then the coefficient of variation is: **Nov-2018**

(a) 15 (b) 25 (c) 17 (d) 19

Answer:

(b) Variance of 5, 7, 9 and 11 is 4

i.e. Variance = 4

S.D (σ) = $\sqrt{4} = 2$

Mean ($\bar{x}$) = $\frac{\sum x}{N} = \frac{5+7+9+11}{4}$

$= \frac{32}{4} = 8$

Coeff. of Variation(C.V.) = $\frac{\sigma}{x} \times 100$

$= \frac{2}{8} \times 100 = 25$

63. Standard Deviation for the marks obtained by a student in monthly test in mathematic (out of 50) as 30, 35, 25, 20, 15 is **Nov-2018**

(a) 25 (b) $5\sqrt{2}$ (c) Var) (d) 50

Answer:

(b) Given data's are

15, 20, 25, 30, 35

Mean ($\bar{x}$) = $\frac{\sum x}{N} = \frac{15+20+25+30+35}{5} = \frac{125}{5} = 25$

For S.D

x	$\bar{x}$	d=x – ($\bar{x}$)	d^2
15	25	-10	100
20	25	-5	25
25	25	0	0
30	25	5	25
35	25	10	100
N= 5			$\sum d^2$

S.D = $\sqrt{\frac{\sum d^2}{N}} = \sqrt{\frac{250}{5}} = \sqrt{5}$

64. If the standard deviation for the marks obtained by a student in monthly test is 36, then the variance is **Nov-2018**

(a) 6 (b) 36 (c) 1296 (d) None of the above

Answer:

(c) If S.D. = 36

Variance () = $(36)^2$

= 1,296

65. If $\sigma^2 = 100$ and coefficient of variation – 20% then $\bar{X}$ **June-2019**

(a) 60 (b) 70 (c) 80 (d) 50

Answer:

(d) If σ^2 = 100 and c.v.= 20%

$\sigma = \sqrt{100} = 10$

c.v. = $\frac{S.D}{A.M} \times 100$

$20 = \frac{10}{X} \times 100$

$20X = 1000$

$X = \frac{1000}{20} = 50$

66. Standard deviation is _____ times of $\sqrt{MD \times QD}$ **June-2019**

(a) 2/3 (b) 4/5 (c) $\sqrt{\frac{15}{8}}$ (d) $\sqrt{\frac{8}{15}}$

Answer:

(c) We know that,

4 S.D. = 5 M.D. = 6 Q.D.

4 S.D. = 5 M.D.

$\frac{S.D}{M.D} = \frac{5}{4}$

4 S.D. = 6 Q.D.

S.D. = $\frac{6}{4}$ Q.D.

$\frac{S.D}{Q.D} = \frac{6}{4}$

Multiply by (1) and (2)

$\frac{S.D}{M.D} \times \frac{S.D}{Q.D} = \frac{5}{4} \times \frac{6}{4}$

$(S.D)^2 = \frac{15}{8}$ M.D. × Q.D

$(S.D) = \sqrt{\frac{15}{8} M.D \times Q.D}$

$S.D = \sqrt{\frac{15}{8}} \sqrt{M.D \times Q.D}$

67. The Q.D of 6 numbers 15, 8, 36, 40, 38, 41 is equal to **June-2019**

(a) 12.5 (b) 25 (c) 13.5 (d) 37

Answer:

(c) Write the terms in Ascending order,

8 , 15, 36 , 38, 40 , 41

Here , N= 4

$Q_1 = \left(\frac{N+1}{4}\right)^{th}$ term

$= \left(\frac{6+1}{4}\right)^{th}$ term

$= 1.75^{th}$ term

$= 1^{st}$ term + 0.75 (2^{nd} term – 1^{st} term)

$= 8 + 0.75 \times (15 - 8)$

$= 8 + 0.75 \times 7$

$= 8 + 5.25$

$= 13.25$

$Q_3 = \frac{3(N+1)^{th}}{4}$ term

$= \frac{3(6+1)^{th}}{4}$ term

$= 5.25^{th}$ term

$= 5^{th}$ term + 0.25 (6^{th} term – 5^{th} term)‘‘

$= 40 + 0.25 (41 – 40)$

$= 40 + 0.25 \times 1$

$= 40 + 0.25$

$= 40.25$

$QD = \frac{Q3-Q1}{2}$

$= \frac{40.25-13.25}{2}$

$= \frac{27}{2} = 13.5$

68. S.D. of first five consecutive natural numbers is ? **June-2019**

(a) $\sqrt{10}$ (b) $\sqrt{8}$ (c) $\sqrt{3}$ (d) $\sqrt{2}$

Answer:

(d) S.D. of 1^{st} ‘n’ Natural No. = $\sqrt{\frac{n^2-1}{12}}$

n = 5

S.D = $\sqrt{\frac{5^2-1}{12}} = \sqrt{\frac{24}{12}}$

$= \sqrt{2}$

69. If the profits of a company remain some for the last ten months then the S.D. of profits of the company would be : **June-2019**

(a) Positive (b) Negative (c) Zero (d) (a) or (c)

Answer:

(c) If the profits of a company remain same for ten months.

then $\boxed{\text{S.D} = 0}$

(Since shifting of origin S.D is not changed)

70. Coefficient of quartile deviation is 1/4 then Q_3/Q_1 is **June-2019**

(a) 5/3 (b) 4/3 (c) 3/4 (d) 3/5

Answer:

(a) Coeff. of Q.D = $\frac{1}{4}$

$\frac{Q_3-Q_1}{Q_3+Q_1} = \frac{1}{4}$

$4 Q_3 – 4 Q_1 = Q_3 + Q_1$

$4 Q_3 – Q_3 = Q_1 + 4 Q_1$

$3 Q_3 = 5 Q_1$

$\frac{Q_3}{Q_1} = \frac{5}{3}$

71. The sum of mean and SD of a series is a + b, if we add 2 to each observation of the series then the sum of mean and SD is **June-2019**

(a) a + b + 2 (b) 6 – a + b (c) 4 +a - b (d) a + b + 4

Answer:

(a) By shifting the origin, Mean is change but S.D. is not changed.

The sum of Mean and S.D of a series.

= (a+b)

If we add '2' in each term then the new sum of mean and S.D.

= (a+b+2)

72. The approximate ratio of SD, MD, QD is : **Nov-2019**

(a) 3 : 4 : 5 (b) 2 : 3 : 4 (c) 6 : 5 : 4 (d) 5 : 6 : 7

73. The deviations are minimum when taken from : **Nov-2019**

(a) Mean (b) Median (c) Mode (d) None

Answer:

(b) The sum of deviations are minimum when taken from median

$\sum[x - Mean]$

$\sum[x - Median]$ $\{Minimum\}$

$\sum[x - Mode]$

74. Origin is shifted by 5, what will happen **Nov-2019**

(a) SD will increase by 5 (b) QD will increase by 5

(c) MD will increase by 5 (d) There will be no change

75. Coefficient of variation is equal to : **Nov-2019**

(a) $\frac{SD}{Mean}$ (b) $\frac{SD}{Mean} \times 100$ (c) $\frac{Mean}{SD} \times 100$ (d) $\frac{Mean}{SD}$

Answer:

(b) In probability theory and statistics the coefficient of variation also known as relative standard deviation is a standardized measure of dispersion of frequency distribution. It is expressed as a percentage and defined as the ratio of SD and mean.

So, coefficient of variation = $\frac{SD}{Mean} \times 100$

76. Find SD of the following **Nov-2019**

1, 2, 3, 4, 5, 6, 7, 8, 9

(a) 2.58 (b) 60/9 (c) 60/3 (d) 3.20

Answer:

(a) S.D = $\sqrt{\frac{\sum x^2}{N} - \left(\frac{\sum x}{N}\right)^2}$

Here N = 9

$x^2 = 1^2 + 2^2 + 3^2 + 4^2 + \ldots\ldots\ldots 9^2$

= 285

$\frac{\sum x}{N} = \frac{1+2+3+4+5+6+7+8+9}{9} = 5$

Put in above formula,

SD = $\sqrt{\frac{285}{9} - \frac{25}{1}}$

SD = $\sqrt{\frac{60}{9}}$

SD = $\sqrt{6.67}$

SD = 2.58

77. If mean = 200 and variance = 80. Find coefficient of variation. **Nov-2019**

(a) 2.56 (b) 4.47 (c) 32 (d) 0.32

Answer:

(b) We know

CV = $\frac{SD}{Mean} \times 100$

$$CV = \frac{\sqrt{Variance}}{Mean} \times 100$$

$$CV = \frac{\sqrt{80}}{200} \times 100$$

$$CV = \frac{\sqrt{80}}{2}$$

$$CV = 4.47(approx)$$

78. Which of the following is affected by shifting of scale. **Nov-2019**

(a) SD (b) MD (c) QD (d) All of these

79. Coefficient of variation is 80. Mean is 20. Find variance: **Nov-2019**

(a) 640 (b) 256 (c) 16 (d) 250

80. SD from numbers 1, 4, 5, 7, 8 is 2.45. If 10 is added to each then SD will be: **Nov-2019**

(a) 12.45 (b) 24.5 (c) 12 (d) Will not change.

Answer:

(d) We know a change in origin of SD causes no change in SD

So, New SD = Originals SD when 10 will be added

So, SD will not change

81. Which of the following measure of dispersion is based on absolute deviations? **Nov – 2020**

(a) Range (b) S.D (c) Mean Deviation (d) Quartile Deviation

82. The best statistical measure used for comparing two series is **Jan – 2021**

(a) Mean absolute deviation (b) Range

(c) Coefficient of variation (d) Standard deviation

83. The relationship between P-series and Q series is given by 2P – 3Q – 10. If the range of P – Series is 18. What would be the range of Q? **Jan – 2021**

(a) 10 (b) 15 (c) 9 (d) 12

Answer:

(d) The Relation b/w P-serises and Q-serises is given by:

$2P-3Q - 10 = 0$

$$b = \frac{-Cofficient\ of\ P}{Cofficient\ of\ Q}$$

$$= \frac{-2}{-3}$$

$$b = \frac{2}{3}$$

Range of Q = [b] rang of P

$$= \left[\frac{2}{3}\right] \times 18$$

$$= \frac{2}{3} \times 18$$

$$= 12$$

84. It is given that the mean (X) is 10 and standard deviation (s.d) is 3.2. If the observations are increased by 4, then the new mean and standard deviation are: **Jan – 2021**

(a) X = 10, s.d. = 7.2 (b) X = 10, s.d. = 3.2 (c) X = 14, s.d. = 3.2 (d) X = 14, s.d. = 7.2

Answer:

(c) Mean $(\bar{X})$ = 10

S.D. (σ) = 3.2

(By shifting the origin Mean is changed)

New mean = 10 + 4 = 14

(∵ each observation are decreased by 4)

By the shifting origin S.D. is not changed

New S.D. = Original S.D. = 3.2

85. Which of the following is a relative measure of dispersion? **Jan – 2021**

(a) Range (b) Mean deviation

(c) Standard deviation (d) Coefficient of quartile deviations

86. Find the coefficient of mean deviation about mean for the data: 5, 7, 8, 10, 11, 13, 19 **Jan – 2021**

(a) 17.25 (b) 28.57 (c) 32.11 (d) 18.56

Answer:

(c) Given data 5,7,8,10,11,13,19

Mean $(\bar{X}) = \frac{\sum x}{N} = \frac{5+7+8+10+11+13+19}{7}$

$= \frac{73}{7} = 10.42$

For M.D.

x	$\bar{x}$	[d] = [x-$\bar{x}$]
5	10.42	5.42
7	10.42	3.42
8	10.42	2.42
10	10.42	0.42
11	10.42	0.58
13	10.42	2.58
19	10.42	8.58
N= 7		$\sum[d]$= 23.42

M.D. $= \frac{\sum[d]}{N} = \frac{23.42}{7} = 3.3457$

Coff. of M.D. $= \frac{M.D.}{mean} \times 100$

$= \frac{3.3457}{10.42} \times 100$

$= 32.11$

87. The mean deviation of the numbers 3, 10, 6, 11, 14, 17, 9, 8, 12 about the mean is (correct to one decimal place): **July – 2021**

(a) 8.7 (b) 4.2 (c) 3.1 (d) 9.8

88. If a school has 14 teachers, their heights (in cm) are:
172, 173, 164, 178, 168, 169, 173, 172, 173, 164, 178, 168, 169, 173 then average deviation of this data is: **July – 2021**

(a) 2.43 approx. (b) 3.93 approx. (c) 3.43 approx. (d) 2.92 approx.

Answer:

(c) Given

x	**A**	$\oint \| \| = \|(x - A)\|$
164	|7|	+7
164	|7|	+7
168	|7|	+3
168	|7|	+3
169	|7|	+2
169	|7|	+2
172	|7|	1
172	|7|	1
173	|7|	2
173	|7|	2
173	|7|	2
173	|7|	2
178	|7|	7
178	|7|	7
N= 14		$\sum \|d\| = 48$

Average deviation $= \frac{\sum|d|}{N}$

$= \frac{48}{14} = 3.43$

89. The standard deviation of 1 to 9 natural number is: **July – 2021**

(a) 6.65 (b) 2.58 (c) 6.75 (d) 5.62

Answer:

(b) S.D. of First 'n' natural No $= \sqrt{\frac{9^2-1}{12}}$

$= \sqrt{\frac{81-1}{12}}$

$= \sqrt{\frac{80}{12}}$

$= 2.58$

90. The probable value of mean deviation when $Q_3 = 40$ and $Q_1 = 15$ is: **July – 2021**

(a) 15 (b) 18.75 (c) 17.50 (d) 0

Answer:

(a) Given $Q_3 = 40$ and $Q_1 = 15$

Coefficient of Q.D. $= \frac{Q_3-Q_1}{2}$

$= \frac{40-15}{2}$

$= \frac{25}{2}$

We know that

4 S.D. = 5 M.D. = 6 Q.D.

Now 5 M.D. = 6 Q.D.

5 M.D. $= 6 \times \frac{25}{2}$

M.D. $= \frac{6\times25}{5\times2}$

M.D. $= 15$

91. If the numbers are 5, 1, 8, 7, 2 then the coefficient of variation is: **July – 2021**

(a) 56.13% (b) 59.13% (c) 48.13% (d) 44.13%

Answer:

(b) Given data's are

1, 2, 5, 7, 8

Mean $(\bar{x}) = \frac{\sum x}{N} = \frac{1+2+5+7+8}{5} = \frac{23}{5} = 4.6$

For S.D.

x	A	d = (x- A)	d^2
1	5	-4	16
2	5	-3	9
5	5	0	0
7	5	2	4
8	5	3	9
N = 5		$\sum d = -2$	$\sum d^2 = 38$

S.D. $= \sqrt{\frac{\sum d^2}{N} - \left(\frac{\sum d}{N}\right)^2} = \sqrt{\frac{38}{5} - \left(\frac{-2}{5}\right)^2}$

$= \sqrt{7.60 - 0.16}$

$= \sqrt{7.44} = 2.72756$

Coeff of variation

(C.V.) $= \frac{S.D}{A.M} \times 100$

$= \frac{2.72756}{4.6} \times 100$

$= 59.13\%$

92. If every observation is increased by 7 then: **July – 2021**

(a) Standard deviation increased by 7 (b) Mean deviation increased by 7
(c) Not affected at all (d) Quartile deviation increased by 7

93. If the relationship between x and y is given by 2x + 3y = 10 and the range of y is 10, then what is the range of x? **July – 2021**

(a) 10 (b) 18 (c) 8 (d) 15

Answer:

(d) Given equation

$2x + 3y = 10$

$2x + 3y - 10 = 0$

$b = -\frac{coeff\ of\ x}{coeff\ of\ y} = -\frac{2}{3}$

Range of y =[b] Range of x

$10 = \left[-\frac{2}{3}\right] \times$ Range of x

$10 = \frac{2}{3} \times$ Range of x

Range of $x = 10 \times \frac{3}{2} = 15$

94. The marks secured by 5 students in subject are 82, 73, 69, 84, 66. What is the coefficient of Range **Dec 2021**

(a) 0.12 (b) 12 (c) 120 (d) 0.012

Answer:

(b) Coefficient of Range $= \frac{Largest\ Observation - Small}{Largest\ Observation + Small}$

Coefficient of Range $= \frac{84-66}{84+66} \times 100 = 12$

95. For a data having odd number of values, the difference between the last and the middle value; similarly the difference between the second last and middle values is equal to that of second last and middle value so on. Therefore, the middle value is equal to **Dec 2021**

(a) Half of the range (b) Half of standard deviation
(c) Mode (d) Mean

Answer:

(d) Here No. of data's = odd (let 3)

i.e. a, b, c

Difference b/w the Ist and the middle value

= Diff. b/w the last and the middle value

$b - a = c - b$

$2b = a + c$

$b = \frac{a+c}{2}$

The middle value is known as **mean** and similarly other case is also satisfied.

96. Mean Deviation of data 3, 10, 10, 4, 7, 18, 5 from mode is **June 2022**

(a) 4.39 (b) 4.70 (c) 4.14 (d) 5.24

Answer:

(c) Mean deviation from mode of following data 3, 10, 10, 4, 7, 18, 5.

Here mode(Mo) = 10

Table =

x	Mode (Mo)	(d) = |x–Mo|
3	10	7
10	10	0
10	10	0
4	10	6
7	10	3
18	10	8
5	10	5
N = 7		$\sum \lvert d \rvert = 29$

$$M.D = \frac{\sum |d|}{N} = \frac{29}{7} = 4.14$$

97. A M and Coefficient of variation of x is 10 and 40. What is the variance 30-2x **June 2022**

(a) 64 (b) 56 (c) 49 (d) 81

Answer:

(a) A.M of x = 10

C.V of x = 40%

$CV = \frac{S.D}{A.M} \times 100$

$40 = \frac{S.D}{10} \times 100$

$S.D = \frac{40 \times 10}{100}$

S.D = 4

i.e S.D of x = 4

Here Let y = 30 – 2x

2x + y – 30 = 0

$b = \frac{-Coeff\ of\ x}{Coeff\ of\ y} = \frac{-2}{1} = -2$

S.D of y = |b| S.D of x

= |–2| × 4 = 2 × 4 = 8

= Variance of y = $(8)^2$ = 64

98. Which of the following is based on absolute deviation? **June 2022**

(a) Standard deviation (b) Mean deviation

(c) Range (d) Quartile deviation

99. Following are the wages of 8 workers 82, 96, 52, 75, 70, 65, 50, 70. Find range and coefficient of range? **June 2022**

(a) 46, 32.70 (b) 43, 31.50 (c) 46, 31.50 (d) 43, 32.70

Answer:

(c) Here Smallest No (S) =50

Largest No (L) = 96

Range = L – S

= 96 – 50

= 46

Coeff. of Range = $\frac{L-S}{L+S} \times 100$

$= \frac{96-50}{96+50} \times 100$

$= \frac{46}{146} \times 100$

= 31.50

100. Find the standard deviation and coefficient of variation for. 1, 9, 8, 5, 7 **June 2022**

(a) 2.828, 49.32 (b) 2.828, 48.13 (c) 2.828, 47.13 (d) 2.282, 50.13

Answer:

(c) Given data

1, 9, 8, 5, 7

mean $(\bar{x}) = \frac{\sum x}{N} = \frac{1+9+8+5+7}{5} = \frac{30}{5} = 6$

for S.D.

x	$\bar{x}$	**d = (x - $\bar{x}$)**	**d^2**
1	6	-5	25
9	6	3	9
8	6	2	4
5	6	-1	1
7	6	1	1

N= 5			$d^2 = 40$

$$S.D. = \sqrt{\frac{\sum d^2}{N}} = \sqrt{\frac{40}{5}} = \sqrt{8}$$
$$= 2 \cdot \sqrt{2}$$
$$= 2.828$$
$$C.V = \frac{S.D}{A.M} \times 100$$
$$= \frac{2.828}{6} \times 100 = 47.13\%$$

101. If the coefficient of variation and standard deviation are 30 and 12 respectively, then the arithmetic mean of the distribution is: **Dec 2022**

(a) 40 (b) 36 (c) 25 (d) 19

Answer:

(a) C.V. = 30 %, S.D. = 12 find $\bar{x}$ = ?

$$C.V. = \frac{S.D.}{Mean} \times 100$$
$$30 = \frac{12}{Mean} \times 100$$
$$Mean = \frac{12 \times 100}{30} = 40$$

102. _____ is based on all the observations and _____ is based on the central fifty percent of the observations. **Dec 2022**

(a) Mean deviation, Range (b) Mean deviation, quartile deviation
(c) Range, Standard deviation (d) Quartile deviation, Standard deviation

103. Which one of the following is not a method of measure of dispersion? **Dec 2022**

(a) standard deviation (b) Mean deviation
(c) Range (d) Concurrent deviation method

104. If the first quartile in 56.50 and the third quartile is 77.50, then the co-efficient of quartile deviation is: **Dec 2022**

(a) 638.09 (b) 15.67 (c) 63.80 (d) 156.71

Answer:

(b) Here:

First quartile Q_1 = 56.50
Third quartile Q_3 = 77.50

$$\text{Coefficient of Q.D.} = \frac{Q_3 - Q_1}{Q_3 + Q_1} \times 100$$
$$= \left(\frac{77.50 - 56.50}{77.50 + 56.50}\right) \times 100$$
$$= \frac{21}{134} \times 100$$
$$= 15.67$$

105. If the sum of square of the values equals to 3390, Number of observations are 30 and Standard deviation is 7, what is the mean value of the above observations? **Dec 2022**

(a) 14 (b) 11 (c) 8 (d) 5

Answer:

(c) Here, $\sum x^2 = 3390$ and S.D. = 7

N = 30 $\bar{x}$ = ?

We know that :

$$S.D. = \sqrt{\frac{\sum x^2}{N} - (\bar{x})^2}$$
$$\mathbf{7} = \sqrt{\frac{\mathbf{3390}}{\mathbf{30}} - (\bar{x})^2}$$

on squaring both side

$$(7)^2 = \frac{3390}{30} - \bar{x}^2$$
$$49 = 113 - (\bar{x})^2$$
$$(\bar{x})^2 = 113 - 49$$

$(\bar{x})^2 = 64$

$\bar{x} = \sqrt{64} = 8$

Mean $(\bar{x}) = 8$

106. If the variance of random variable 'x' is 17, then what is variance of y = 2x + 5? **Dec 2022**

(a) 34 (b) 39 (c) 68 (d) 78

Answer:

(c) Given, v(x) = 17

S.D of x = $\sqrt{17}$

Given Equation y = 2x + 5

2x – y + 5 = 0

B = $\frac{-Coeffiofx}{Coeffi\ of\ y} = \frac{-2}{-1} = 2$

S.D of y = |b| S.D of x

= $|2| \times \sqrt{17}$

= $2\sqrt{17}$

v(y) = $(2\sqrt{17})^2$

= 4×17

v(y) = 68

107. If the variance of given data is 12, and their mean value is 40, what is coefficient of variation (CV)? **Dec 2022**

(a) 5.66% (b) 6.66% (c) 7.50% (d) 8.65%

Answer:

(d) Variance = 12

S.D = $\sqrt{12} = 2\sqrt{3}$

Mean $(\bar{x})$ = 40

C.V = $\frac{S.D}{Mean} \times 100$

= $\frac{2\sqrt{3}}{40} \times 100$

= 8.65%

108. In a given set if all data are of same value then variance would be: **Dec 2022**

(a) 0 (b) 1 (c) -1 (d) 0.5

109. If x and y are related as 4x+3y+11= and mean deviation of y is 7.2 then mean deviation of xis ? June 2023

(a) 2.70 (b) 7.20 (c) 4.20 (d) 5.40

Answer :

(d) Given Equation

4x + 3y + 11 = 0

b = $\frac{-\text{Coeff of x}}{\text{Coeff of y}} = \frac{-4}{3}$

M.D of y = | b | M.D of x

7.2 = $\left|\frac{-4}{3}\right| \times$ M. D of x

7.2 = $\frac{4}{3} \times$ M.D of x

M.D of x = $\frac{3}{4} \times 7.2$

= 5.40

110. If the first quartile is 42.75 and the third quartile is 74.25 then the co-efficient of QD is . June 2023

(a) 29.62 (b)15.75 (c) 17.57 (d) 0.2692

Answer:

(d) First Quartile (Q_1) = 42.75

Third Quartile (Q_3) = 74.25

Coefficient of Q.D. = $\frac{Q_3 - Q_1}{Q_3 + Q_1}$

$= \left(\frac{74.25-42.75}{74.25+42.75}\right)$

$= \frac{31.50}{117}$

$= 0.2692$

111. Find mean deviation about mean for the date 12, 16, 21, 30, 35,39, 40 June 2023

(a) 9.14 (b) 9.14 (c) 8.91 (d) 9.81

Answer:

(b) Given data 12, 16, 21, 30, 35, 39, 40

Mean (x) $= \frac{\sum x}{N} = \frac{12+16+21+30+35+39+40}{7}$

$= \frac{193}{7}$

$= 27.57$

x	$\bar{x}$	$\lvert d \rvert = \lvert x - \bar{x} \rvert$
12	27.57	15.57
16	27.57	11.57
21	27.57	6.57
30	27.57	2.43
35	27.57	7.43
39	27.57	11.43
40	27.57	12.43
N= 7		$\sum \lvert d \rvert$= 67.43

M.D. $= \frac{\sum |d|}{N} = \frac{67.43}{7}$ = 9.63 (approx)

112. If the Standard Deviation of data 2,4,5,6,8,17, is 4. 47 then Standard Deviation of the data 4,8,10,12,16,34,is . June 2023

(a) 4.47 (b) 8.94 (c) 13.41 (d) 2.24

Answer:

(b) By shifting the scale S.D. is changed

S.D. of 2, 4, 5, 6, 8, 17 is 4.47

then S.D. of 4, 8, 10, 12, 16, 34 is 2 × 4.47

= 8.94

(Since, all observation is doubled so S.D. is also doubled)

113. The mean and variance of a group of 100 observations are 8 and 9 respectively of 100 observations , the mean and standard deviation of 60 observation 10 and 2 respectively . Find the standard deviation of remaining 40 . June 2023

(a) 4.5 (b) 3.5 (c) 2.5 (d) 1.5

Answer:

(d) Total No. of observation = 100

Combined mean $(\bar{x})$ = 8

Combined S.D. $(\sigma) = \sqrt{9} = 3$

No. of observation of 1st group (n_1) = 60

Mean of 1st group $(\bar{x}_1)$ = 10

S.D. of 1st group (σ_1) = 2

No. of observation of 2nd group (n_2) = 100 – 60 = 40

Mean of 2nd group $(\bar{x}_2)$ = ?

S.D. of 2nd group (σ_2) = ?

Now

Combined Mean $(\bar{x}) = \frac{n_1\bar{x}_1+n_2\bar{x}_2}{n_1+n_2}$

$8 = \frac{60\times10+40\times\bar{x}_2}{60+40}$

$800 = 600 + 40\bar{x}_2$

$200 = 40\bar{x}_2$

$\bar{x}_2 = 5$

Now $d_1 = \bar{x}_1$, $\bar{x} = 10$, $8 = 2$
$d_2 = \bar{x}_2$, $\bar{x} = 5$, $8 = 3$

$$\text{Combined S.D. } (\sigma) = \sqrt{\frac{n_1\sigma_1^2+n_2\sigma_2^2+n_1d_1^2+n_2d_2^2}{n_1+n_2}}$$

$$3 = \sqrt{\frac{60\times2^2+40\sigma_2^2+60\times4+40\times(3)^2}{60+40}}$$

on squaring

$$(3)^2 = \left(\sqrt{\frac{60\times4+40\times\sigma_2^2+60\times4+40\times9}{60+40}}\right)^2$$

$$9 = \frac{240+40\sigma_2^2-+240+360}{100}$$

$$900 = 480 + 40\sigma_2^2 + 360$$
$$900 - 480 - 360 = 40\sigma_2^2$$
$$60 = 40\sigma_2^2$$
$$\sigma_2^2 = \frac{60}{40}$$
$$\sigma_2^2 = 1.5$$
Variance = 1.5

114. For the given set normally distributed data , the following statistical data are know: Mean =6 ; Standard Deviation =2.6; Median = 5and Q deviation = 1.5, then the coefficient of quartile deviation equals to. June 2023

(a) 30 (b) 32 (c) 25 (d) 39

Answer :

(a) Mean = 6, S.D = 2.6, Median = 5
Q.D = 1.5,Coeff of Q.D = ?

$$\text{Coeff of Q.D} = \frac{Q_3Q_1}{Q^3Q^1}\times100$$

$$= \frac{\left(\frac{Q_3-Q_1}{2}\right)}{\left(\frac{Q_3+Q_1}{2}\right)} \times 100$$

$$= \frac{\text{Q.D}}{\text{Median}} \times 100$$

$$= \frac{1.5}{5} \times 100$$

$$= 30$$

115. If the quartile deviation is 12 and the first quartile is 25, then the value of the third quartile is : dec 2023

(a) 37 (b) 49 (c) 61 (d) 60

Answer :

(b) Here , Q.D = 12 , $Q_1 = 25$, $Q_3 = ?$

$$\text{Quartile Deviation Q.D} = \frac{Q_3-Q_1}{2}$$

$$12 = \frac{Q_3-25}{2}$$

$$24 = Q_3 - 25$$
$$Q_3 = 24 + 25$$
$$Q_3 = 49$$

116. If 'x' and 'y' are related as 3x-4y=20 and the quartile deviation of 'x' is 12, then the quartile of 'y' is: dec 2023

(a) 9 (b) 8 (c) 7 (d) 6

Answer:

(a) Given Equation $3x - 4y = 20$
$3x - 4y - 20 = 0$

$$b = \frac{-Coeff.ofx}{Coeff.ofy} = \frac{-3}{-4} = \frac{3}{4}$$

$$\text{Q.D. of } y = \int b \int Q.D. \text{ of } x$$

$$= \frac{3}{4} \times 12$$

$= \frac{3}{4} \times 12 = 9$

Answer Key																			
1	a	2	c	3	c	4	b	5	a	6	a	7	d	8	a	9	d	10	d
11	c	12	b	13	b	14	c	15	c	16	b	17	a	18	b	19	c	20	b
21	b	22	b	23	b	24	c	25	c	26	c	27	b	28	b	29	b	30	d
31	c	32	c	33	a	34	d	35	c	36	c	37	c	38	a	39	b	40	a
41	a	42	a	43	d	44	c	45	b	46	d	47	b	48	a	49	a	50	b
51	d	52	d	53	d	54	-	55	-	56	-	57	-	58	c	59	a	60	b
61	c	62	b	63	b	64	c	65	d	66	c	67	c	68	d	69	c	70	a
71	a	72	c	73	b	74	d	75	b	76	a	77	b	78	d	79	b	80	d
81	c	82	b	83	d	84	c	85	d	86	c	87	c	88	c	89	b	90	a
91	b	92	c	93	d	94	b	95	d	96	c	97	a	98	b	99	c	100	c
101	a	102	b	103	d	104	b	105	c	106	c	107	d	108	a				

CHAPTER
CORRELATION

PAST YEAR QUESTIONS

1. The coefficient of correlation r between x and y when : Cov (x, y) = - 16.5, Var (x) = 2.89, Var (y) = 100 is: **Nov-2006**

(a) -0.97 (b) 0.97 (c) 0.89 (d) -0.89

2. If the sum of squares of the rank difference in mathematics and physics marks of 10 students is ,22, then the coefficient of rank correlation is: **Feb-2007**

(a) 0.267 (b) 0.867 (c) 0.92 (d) None

3. The coefficient of correlation between X and Y is 0.6. U and V are two variables defined as $U = \frac{x-3}{2}$, $V = \frac{y-2}{3}$ is then the coefficient of correlation between U and V is : **May-2007**

(a) 0.6 (b) 0.4 (c) 0.8 (d) 1

4. For 10 pairs of observations, number of concurrent deviations was found to be 4. What is the value of the coefficient of concurrent deviation ? **Aug-2007**

(a) $\sqrt{0.2}$ (b) $\frac{1}{3}$ (c) $-\frac{1}{3}$ (d) $-\sqrt{0.2}$

5. If the covariance between two variables is 20 and the variance of one of the variables is 16, what would be the variance of the other variable? **Aug-2007**

(a) More than 10 (b) 25 or more (c) More than 1.25 (d) Less than 10

6. In rank correlation, the association need not be linear: **Nov-2007**

(a) True (b) False (c) Partly True (d) Partly False

7. If the sum of square of differences of rank is 50 and number of items is 8 then what is the value of rank correlation coefficient, **Dec - 2008**

(a) 0.59 (b) 0.40 (c) 0.36 (d) 0.63

8. If coefficient of correlation between x and y is 0.46. Find coefficient of correlation between x and y/2 **Dec - 2008**

(a) 0.46 (b) 0.92 (c) - 0.46 (d) - 0,92

9. Correlation coefficient between X and Y will be negative when:- **Dec - 2009**

(a) X and Y are decreasing (b) X is increasing, Y is decreasing

(c) X and Y are increasing (d) None of these

10. If 'P' is the simple correlation coefficient, the quantity P^2 is known as: **June-2010**

(a) Coefficient of determination (b) Coefficient of Non-determination

(c) Coefficient of alienation (d) None of the above.

Answer:

(a) Better measure for measuring correlation is provided by the square of correlation coefficient, know as

'coefficient of determination' which is expressed as –

$r^2 = \frac{Explained\ Variance}{Total\ Variance}$

11. If the correlation between x and y is r, then between $U = \frac{x-5}{10}$ and $V = \frac{y-7}{2}$ is **June-2010**

(a) r (b) – r (c) (r–5)/2 (d) (r–7)/10

Answer:

(a) $x - 10u = 5 \longrightarrow$ (1) eq.

$y - 2v = 7 \longrightarrow$ (2) eq.

Since correlation coefficient (Karl Pearson's) is independent of both scale and origin, therefore,

P(u, v) = p(x, y) = r

It may be noted that if

$u_1 = ax_1 + b$ and $v_i = cy_i + d$, then

r(u ,v) = p(x ,y) if a and c are of same signs

r(u ,v) = -p(x ,y) if a and c are of opposite signs

12. If the sum of the product of deviations of x and y series from their means is zero, then the

coefficient of correlation will be **Dec - 2010**

(a) 1 (b) –1 (c) 0 (d) None of these

Answer:

(c) Coefficient of correlation = $\frac{Cov(x,y)}{Sx \times Sy} = \frac{\sum(x-\bar{x})(y-\bar{y})}{n \times \sigma_x \times \sigma_y}$

Cov (x, y) = $\frac{\sum xy}{x} - \bar{x}\bar{y} = 0$

It is given that the above value

⇨ $\sum(x-\bar{x})(y-\bar{y}) = 0$ (Numerator)

Hence, Coefficient of correlation = $\frac{0}{Sx \times Sy} = 0$

13. Three competitors in a contest are ranked by two judges in the order 1,2,3 and 2,3,1 Spearman's rank correlation coefficient. **June - 2011**

(a) -0.5 (b) -0.8 (c) 0.5 (d) 0.8

Answer:

(a)

Rank by Ist Judge R_1	Rank by IInd Judge R_2	Diff D = $R_1 - R_2$	D^2
1	2	-1	1
2	3	-1	1
here $\frac{3}{n=3}$	1	+2	4
			$\sum D^2 = 6$

Spearman's Rank Correlation coefficient = $1 - \frac{6\sum D^2}{n(n^2-1)}$

$= 1 - \frac{6 \times 6}{3(3^2-1)}$

$= -0.5$

14. In a normal distribution, the relationship between the three most commonly used measures of dispersion are: **June - 2012**

(a) Standard Deviation > Mean Deviation > Quartile Deviation

(b) Mean Deviation > Standard Deviation > Quartile Deviation

(c) Standard Deviation > Quartile Deviation > Mean Deviation

(d) Quartile Deviation > Mean Deviation > Standard Deviation

15. In Spearman's Correlation Coefficient, the sum of the differences of ranks between two variables shall be _____. **Dec-2012**

(a) 0 (b) 1 (c) -1 (d) None of the above.

16. The coefficient of correlation between two variable x and y is 0.28. Their covariance is 7.6. If the variance of x is 9, then the standard deviation of y is: **June - 2013**

a) 8.048 b) 9.048 c) 10.048 d) 11.048

Answer:

(b) Coeff of correlation (r) = 0.28

Cov (x,y) = 7,6

Var (x) = 9

S.D. (σx) = $\sqrt{9} = 3$

S.D. of y (σy) = ?

We know that

$r = \frac{Cov(x,y)}{\sigma x, \sigma y}$

$0.28 = \frac{7,6}{3 \times \sigma y}$

$\sigma y = \frac{760^{190}}{3 \times 0.28}$

$\sigma y = 9.048$

17. Two variables x and y are related according to 4x + 3y = 7. Then x and y are: **June - 2013**

a) Positively correlated b) Negatively correlated. c) Correlation is zero d) None of these.

Answer:

(b) Given Regression Equation

$4x + 3y = 7$ and $4x + 3y = 7$

$3y = 7 - 4x$ $\quad 4x = 7 - 3y$

$y = \frac{7}{3} \frac{-4x}{3}$ $\quad x = \frac{7}{4} \frac{-3y}{4}$

$y = a + bx$ $\quad x = a + by$

$b = -4/3 = byx$ $\quad b = -3/4 = bxy$

$r = \pm\sqrt{byx \times bxy}$

$= \pm\sqrt{(\frac{-4}{3})(\frac{-3}{4})}$

$= -\sqrt{1}$ [∴both bxy & byx are negative]

$r = -1$ (Negative correlated)

18. Price and Demand is the example for **Dec - 2013**

(a) No correlation (b) Positive correlation (c) Negative (d) None of the above

19. When each individual gets the exactly opposite rank by the two Judges, then the rank correlation will be _____ **Dec - 2013**

a) 0 b) –1 c) +1 d) 1/2

20. If the value of correlation coefficient between x & y is 1, then the value of correlation coefficient between x – 2 and -y/2 +1is: **Dec - 2014**

a) 1 b) -1 c) -1/2 d) 1/2

Answer:

(b) Given $r_{xy} = 1$

Let $x - 2 = u$ and $\frac{-y}{2} + 1 = v$

$x = 2 + u$ $\quad \frac{-y+2}{2} = v$

Comparing from

$x = a + bu$ $\quad -y + 2 = 2v$

we get $b = 1$ $\quad y = 2 - 2v$

on comparing

$y = c + dv$

we get

$d = -2$

$r_{xy} = \frac{b.d}{|b||d|} r_{uv}$

$1 = \frac{1\times(-2)}{|1||-2|} .r_{uv}$

$1 = \frac{-2}{2} r_{uv}$

$r_{uv} = -1$

21. When the correlation coefficient r is equal to + 1, all the points in a scatter diagram would be **June-2015**

a) On a straight line directed from upper left to lower right

b) On a straight line directed from lower left to upper right

c) On a straight line d) Both (a) and (b)

22. In case of "Insurance Companies" profits & the number of claims they have to pay there is _____ **Dec-2015**

a) Positive b) Negative c) No Correlation d) None of the above

23. The coefficient of correlation between x and y is 0.6. If x and y values are multiplied by -1, then the correlation will be: **June-2017**

a) 0.6 b) - 0.6 c) 1/0.6 d) 1-0.6

24. The regression coefficient is independent of the change of **Dec-2017**

a. Origin b. Scale c. Both (a) and (b) d. Neither (a) nor (b) .

25. r = 0.6 then the coefficient of non-determination will be: **Dec-2017**

(a) 0.40 (b) -0.60 (c) 0.36 (d) 0.64

Answer:

(d) Given r = 0.06

Coefficient of non determination = $1 - r^2$

$= 1 - (0.6)^2$

$= 1 - 0.36$

$= 0.64$

26. The correlation coefficient (r) is the _____ of the two regression coefficients (b_{yx} and b_{xy}) **Dec-2017**

(a) AM (b) GM (c) HM (d) Median

Answer:

(b) The coefficient of correlation (r) is the G.M. of the two regression coefficient (byx × bxy)

$r = \sqrt{byx \times bxy}$

27. If the plotted points is a scatter diagram are evenly distributed, then the correlation is **May-2018**

(a) Zero (b) Negative (c) Positive (d) (a) Or (b)

28. The covariance between two variables is **May-2018**

(a) Strictly positive (b) Strictly negative

(c) Always Zero (d) Either positive or negative or zero

29. In the method of Concurrent Deviations, only the directions of change (Positive direction/Negative direction) in the variables are taken into account for calculation of **May-2018**

(a) Coefficient of SD. (b) Coefficient of regression

(c) Coefficient of correlation (d) none

30. Correlation coefficient is of the units of measurement. **May-2018**

(a) dependent (b) independent (c) both (d) none

31. In case speed of an automobile and the distance required to stop the car after applying brakes correlation is **May-2018**

(a) Positive (b) Negative (c) Zero (d) None

32. Rank correlation coefficient lies between **May-2018**

(a) 0 to 1 (b) – 1 to +1 inclusive of these value

(c) – 1 to 0 (d) both

33. If the correlation coefficient between the variables X and Y is 0.5, then the correlation coefficient between the variables 2x – 4 and 3 – 2y is **Nov-2018**

(a) 1 (b) 0.5 (c) –0.5 (d) 0

Answer:

(c) If coefficient of correlation $r_{xy} = 0.5$

Given u = 2x – 4 and v = 3 – 2y

2x – u – 4 = 0 and 2y + v – 3 = 0

$b = \frac{-Coeff.of u}{Coeff.of x}$ and $d = \frac{-Coeff.of\ v}{Coeff.of y}$

$= \frac{-(-1)}{2}$ $d = \frac{-1}{2}$

$b = \frac{1}{2}$ $d = \frac{-1}{2}$

Here, b and d both have different sign so $r_{uv} = -r_{xy}$

$= -0.5$

34. Given that **June-2019**

X	-3	-3/2	0	3/2	3
Y	9	9/4	0	9/4	9

Then Karl Pearson's coefficient of correlation is

(a) Positive (b) Zero (c) Negative (d) None

Answer:

(b) Given that

x	-3	-3/2	0	3/2	3

y	9	9/4	0	9/4	9

then

Karlpearson's Coefficient of Correlation is "Zero" because it is equally distribute.

35. Determine Spearman's rank correlation from the given data $\sum d^2 = 30$, n = 10: **June-2019**

(a) r = 0.82 (b) r = 0.32 (c) r = 0.40 9d) None of the above

Answer:

(a) Here, $\sum d^2$ = 30, n = 10

Spearman's rank correlation

$$r_n = 1 - \frac{6\sum d^2}{n(n^2-1)}$$

$$= 1 - \frac{6\times30}{10(10^2-1)} = 1 - \frac{180}{990} = 1 - \frac{2}{11} = \frac{9}{11}$$

= 0.82

36. What is the coefficient of correlation from the following data? **Nov-2019**

x:	1	2	3	4	5
y:	5	4	3	2	6

(a) 0 (b) – 0.75 (c) – 0.85 (d) 0.82

37. If the plotted points in a scatter diagram lie from upper left to lower right, then correlation is **Nov-2019**

(a) Positive (b) Negative (c) Zero (d) None of these

38. Which of the following is spurious correlation? **Nov – 2020**

(a) Correlation between two variables having a causal relationship

(b) Negative correlation

(c) Bad relation between two variables(d) Very low correlation between two variables.

39. Scatter diagram does not help us to ? **Nov – 2020**

(a) Find the type of correlation (b) Identify whether variables correlated or not

(c) Determine linear or non-linear correlation (d) find the numerical value of correlation

40. The covariance between two variables is **Nov – 2020**

(a) Strictly positive (b) Strictly negative

(c) Always Zero (d) Either positive or negative or Zero

41. For the set of observations {(1,2), (2,5), (3,7), (4,8), (5,10)} the value of kart-person's coefficient of correlation is approximately given by **Jan – 2021**

(a) 0.755 (b) 0.655 (c) 0.525 (d) 0.985

Answer:

(d)

x	dx = x – A = x - 3	dx^2	y	dy = y – B = y - 7	dy^2	dx.dy
1	1 – 3 = -2	4	2	2 – 7 = -5	25	10
2	2 – 3 = -1	1	5	5 – 7 = -2	4	2
A (3)	3 – 3 = 0	0	7	7 – 7 = 0	0	0
4	4 – 3 = 1	1	8	8 – 7 = 1	1	1
5	5 – 3 = 2	4	10	10 – 7 = 3	9	6
$\sum x$ = 15	$\sum dx$ = 0	$\sum dx^2$ = 2	$\sum y$ =32	$\sum dy$ = -3	$\sum dy^2$ =39	$\sum dxdy$ =19

Coff. of correlation $r = \frac{N\sum d_x d_y - \sum d_x \cdot \sum d_y}{\sqrt{N\sum d_x^2 - (\sum d_x)^2}\sqrt{N\sum d_y^2 - (\sum d_y)^2}}$

$$r = \frac{5\times19 - 0\times(-3)}{\sqrt{5\times10-(0)^2}\sqrt{5\times39-(-3)^2}}$$

$$= \frac{95-0}{\sqrt{50-0}\sqrt{195-9}}$$

$$r = \frac{95}{\sqrt{50}\sqrt{186}}$$

$$= \frac{95}{\sqrt{9300}}$$

$$r = \frac{95}{96.44} = 0.985$$

42. The coefficient of correlation between x and y is 0.5 the covariance, is 16, and the standard deviation of y is **Jan – 2021**

(a) 4 (b) 8 (c) 16 (d) 64

Answer:

(b) Given Coeff. of correlation (r) = 0.5

(Covariance) Cov.(x,y) = 16

S.D. of x (σ x) = 4

S.D. of y (σ y) = ?

Coeff. of Correlation

$$r = \frac{Cov(x,y)}{\sigma x \cdot \sigma y}$$

$$0.5 = \frac{16}{4 \times \sigma y}$$

$$\sigma y = \frac{16}{4 \times 0.5}$$

$$\sigma y = \frac{16}{2}$$

$$\boxed{\sigma y = 8}$$

43. If y = 9x and x = 0.01y then r is equal to **July – 2021**

(a) – 0.1 (b) 0.1 (c) + 0.3 (d) - 0.3

44. If the sum of the product of the deviations of X and Y from their means is zero the correlation coefficient between X and Y is: **July – 2021**

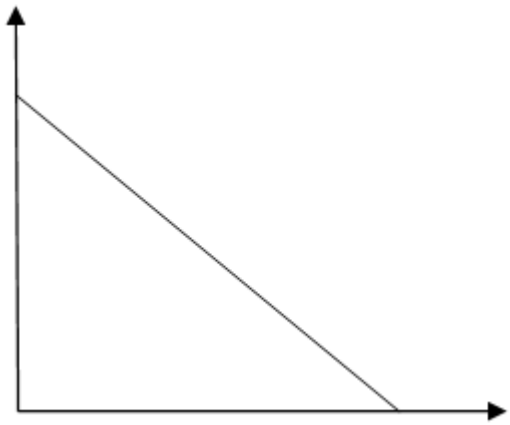
(a) Zero (b) Positive (c) Negative (d) 10

45. If the data points of (X, Y) series on a scatter diagram lie along a straight line that goes downwards as X -values move from left to right, Then the data exhibit …….. correlation. **Dec 2021**

(a) Direct (b) Indirect (c) Indirect (d) Imperfect direct

Answer:

(c)



This is a Perfect Negative correlation, or indirect correlation.

46. If Coefficient of correlation for 3x + 4y = 6 is 0.5. Find the coefficient of correlation for of 3u + 9v = 7 for u and v. **June 2022**

(a) – (0.5) (b) + (0.5) (c) ± 0.5 (d) 0.25

47. Karl Pearson Correlation Coefficient method is used for – **June 2022**

(a) Any data (b) Scattered data (c) Grouped data (d) Ungrouped data

48. If the plotted point in a scatter diagram lie from lower left to upper right then correction is: **June 2022**

(a) Positive (b) Negative (c) Perfectively negative (d) Zero

49. If concurrent coefficient is $\frac{1}{\sqrt{3}}$. If sum deviation is 6 for n pairs of data? **June 2022**

(a) 9 (b) 8 (c) 10 (d) 11

Answer:

(c) Given $r_c = \frac{1}{\sqrt{3}}$, n = ?

c = 6

Coeff of concurrent deviation

$$r_c = \pm\sqrt{\frac{2c-m}{m}}$$

$$\frac{1}{\sqrt{3}} = \pm\sqrt{\frac{2\times6-m}{m}}$$

On squaring Both side

$$\left(\frac{1}{\sqrt{3}}\right)^2 = \left(\mp\sqrt{\frac{12-m}{m}}\right)^2$$

$$\frac{1}{3} = \frac{12-m}{m}$$

m = 36 – 3m

m + 3m = 36

4m = 36

$m = \frac{36}{4} = 9$

n = m + 1 = 9 + 1 = 10

50. Which of the following is used to find correlation between two qualitative characteristics **June 2022**

(a) Karl Pearson (b) Spearman rank Correlation

(c) Concurrent deviation (d) Scatter diagram

51. Scattered diagram is used the plot **June 2022**

(a) Quantitative data (b) Qualitative data (c) Discrete data (d) Continuous data

52. The coefficient of rank correlation between the ranking of following 6 students in two subjects mathematics and Statistics is: **Dec 2022**

Mathematics	3	5	8	4	7	10
Statistics	6	4	9	8	1	2

(a) 0.25 (b) 0.35 (c) 0.38 (d) 0.20

Answer:

(a) MATHEMATICS → X , STATISTICS → Y

Table

Marks of Maths (x)	**Rank of 'x' R_x**	**Marks of Stats (y)**	**Rank of y (R_y)**	**d = Rx - Ry**	**d^2**
3	6	6	3	3	9
5	4	4	4	0	0
8	2	9	1	1	1
4	5	8	2	3	9
7	3	1	6	-3	9
10	1	2	5	-4	16
n = 6					$d^2 = 44$

Coeff. of rank correlation

$$r_R = 1 - \frac{6\sum d^2}{n(n^2-1)}$$

$$= 1 - \frac{6\times44}{6(6^2-1)}$$

$$= 1 - \frac{\cancel{6}\times44}{\cancel{6}\times35}$$

$$= 1 - \frac{44}{35}$$

$$= \frac{-9}{35}$$

$r_R = -0.257$

$r_R = -0.25$

53. Pearson's Correlation coefficient between x and y is:- **Dec 2022**

(a) $\frac{cov(x,y)}{S_xS_y}$ (b) $\frac{cov^2(x,y)}{S_xS_y}$ (c) $\frac{(S_xS_y)^2}{cov(x,y)}$ (d) $\frac{S_xS_y}{cov(x,y)}$

54. Given that ₹=0.4 and n =81 determine the units for the population evaluation coefficient . **June 2023**

(a) (0.33, 0.466) (b) (0.367, 0,433) (c) (0.337, 0.463) (d) (0.373, 0.427)

Answer :

(c) Given R = 0.4 and n = 81

Now P.E = $\frac{2}{3}\left(\frac{1-R^2}{\sqrt{n}}\right) = \frac{2}{3}\left[\frac{1-(0.4)^2}{\sqrt{81}}\right]$

$= \frac{2}{3}\left(\frac{1-0.16}{9}\right)$

$= \frac{2}{3}\left(\frac{0.84}{9}\right)$

$= \frac{1.68}{27}$

= 0.063

The limit of population of correlation coefficient

= (r ± P.E)

= [(r – P.E), (r + P.E)]

= [(0.4 – 0.063), 0.4 + 0.063]

= [0.337, 0.463]

55. Spearman rank correlation coefficient Y_R I given by: **June 2023**

(a) 1 - $\frac{6\sum d1^2}{n\,(n^2+1)}$ (b) 1 + $\frac{6\sum d1^2}{n\,(n^2-1)}$ (c) 1 + $\frac{6\sum d1^2}{n\,(n^2+1)}$ (d) 1 - $\frac{6\sum d1^2}{n\,(n^2-1)}$

Answer:

(b) Coeff of Rank Correlation (r) = 1 – $\frac{6\sum d_1^2}{n(n^2-1)}$

Answer Key

1.	a	2.	b	3.	a	4.	c	5.	b	6.	a	7.	b	8.	a	9.	b	10.	a
11.	a	12.	c	13.	a	14.	a	15.	a	16.	b	17.	b	18.	c	19.	b	20.	b
21.	b	22.	b	23.	a	24.	a	25.	d	26.	b	27.	a	28.	d	29.	c	30.	b
31.	a	32.	b	33.	c	34.	b	35.	a	36.	a	37.	c	38.	a	39.	d	40.	d
41.	d	42.	b	43.	c	44.	a	45.	c	46.	b	47.	d	48.	a	49.	c	50.	b
51.	a	52.	a	53.	a													

CHAPTER REGRESSION

PAST YEAR QUESTIONS

1. For some bivariate data, the following results were obtained for the two variables x and y : $\bar{x}$ = 53.2, $\bar{y}$ = 27.9, b_{yx} = -1.5, b_{xy} = -0.2 .The most probable value of y when x = 60 is : **Nov-2006**

(a)15.6 (b) 13.4 (c) 19.7 (d) 17.7

2. The lines of regression are as follows : 5x - 145 = - 10y_; 14y - 208 = -8x. The mean values $\bar{x}, \bar{y}$ is: **Nov-2007**

(a) (12, 5) (b) (5, 7) (c) (7, 12) (d) (5, 12)

3. Given the following data : b_{xy} = 0.4 & b_{yx} = 1.6. The coefficient of determination is : **Feb-2008**

(a) 0.74 (b) 0.42 (c) 0.58 (d) 0.64

4. The method applied for deriving regression equations is known as : **Feb-2008**

(a) Concurrent deviation (b) Product moment (c) Least squares (d) Normal equation

5. If the lines of regression in a bivariate distribution are given by x + 2y = 5 and 2x + 3y = 8, then the coefficient of correlation is: **Feb-2008**

(a) 0.866 (b) - 0.666 (c) 0.667 (d) - 0.866

6. If the correlation coefficient between two variables is 1, then the two lines of regressions are **Feb-2008**

(a) Parallel (b) At right angles (c) Coincident (d) None of these

7. Given the regression equations as 3x + y = 13 and 2x +5y = 20. Find regression equation of y on x. **Dec-2008**

(a) 3x + y =13 (b) 2x + y = 20 (c) 3x + 5y = 13 (d) 2x + 5 y = 20

8. The coefficient of correlation is significant if: **Dec-2008**

(a) r > 5P.E (b) r < 6 P.E. (c) r > 6P.E (d) r = 6P.E

9. The two regression equations are : 2x + 3y+ 18 = 0, x+2y-25=0 find the value of y if x = 9 **June-2009**

(a) –8 (b) 8 (c) – 12 (d) 0

10. The correlation coefficient between x and y is -1/2. The value of ^{b}xy = –1/8. Find by x. **June-2009**

(a) –2 (b) –4 (c) 0 (d) 2

11. Which of the following regression equations represent regression line of Y on X : 7x + 2y + 15 = 0, 2 x + 5y + 10 = 0 **Dec-2009**

(a)7x + 2y + 15 = 0 (b) 2x + 5y + 10 = 0 (c) Both (a) and (b) (d) None of these

Answer:

(b) 7x + 2y + 15 = 0 ……(1)

2x + 5y + 10 = 0 ……(2)

Assume that 7x + 2y + 15 = 0 is the regression line of X on Y and 2x + 5y + 10 = 0 is the regression line of Y and X.

7x + 2y + 15 = 0

$X = \frac{-2y}{7} \quad \frac{-15}{7}$

$b_{xy} = -\frac{2}{7}$

2x + 5y + 10 = 0

$Y = -\frac{2x}{5} \quad -\frac{10}{5}$

$b_{yx} = -\frac{2}{5}$

$r^2 = b_{xy} \times b_{yx}$

$= -\frac{2}{7} \times -\frac{2}{5}$

$r = \sqrt{\frac{4}{35}}$

r = - 0.33

Since $-1 \leq r \leq 1 \therefore$ our assumption is correct So, 2x + 5y + 10 = 0 is the regression line Y on X.

12. The two regression lines are 7 x – 3 y –18 = 0 and 4x – y – 11 = 0. Find the values of b_{yx} and b_{xy} **Dec-2009**

(a) 7/3,1/4 (b) –7/3, –1/4 (c) –3/7,–1/4 (d) None of these.

Answer:

(a) Assume that 7x – 3y – 18 = 0 is the line

7x – 3y – 18 = 0 of Y on X and 4x – y – 11 = 0 is X on Y.

$3y = 7x - 18$

$y = \frac{7x}{3} - \frac{18}{3}$

$b_{yx} = \frac{7}{3}$

$4x - y - 11 = 0$

$4x = y + 11$

$x = \frac{y}{4} + \frac{11}{4}$

$b_{xy} = \frac{1}{4}$

$r^2 = b_{xy} \times b_{yx}$

$r = \sqrt{\frac{1}{4} \times \frac{7}{3}}$

$r = \sqrt{\frac{7}{12}} = 0.764$

since value of r is lying between – 1 and 1 therefore our assumption was correct.

So, $b_{yx} = \frac{7}{3}$ and $b_{xy} = \frac{1}{4}$

13. _____ of the regression Coefficients is greater than the correlation coefficient **June-2010**

(a) Combined mean (b) Harmonic mean (c) Geometric mean (d) Arithmetic mean.

Answer:

(d) Correlation Coefficient (r) is the Geometric Mean (G.M.) between two co regression coefficients.

$r = \pm\sqrt{b_{xy} \cdot b_{yx}}$

Since, AM > GM > HM

Therefore, AM of regression coefficients is greater than correlation coefficient.

14. If 2 regression lines are x + 2y = 5 and 2x + 3y–8 = 0. The regression line of y on x **June-2010**

(a) x + 2y–5 = 0 (b) 2x + 3y–8 = 0 (c) Any of the two lines (d) of the two lines

Answer:

(c) Let us take equation (1) as

$$x + 2y - 5 = 0$$

$$byx = \frac{\text{coeff. of } x}{\text{coeff. of } y} = \frac{-1}{2} = -0.5$$

Now, let us take equation (2) as

$$2x + 3y - 8 = 0$$

$$byx = -\frac{2}{3} = -0.66$$

In both the cases $r < 1$

Hence, any of the two lines can be regression line of y on x.

15. Regression coefficient are _____ **Dec-2010**

(a) Dependent of origin and of scale(b) Independent of both change of origin and of scale.

(c) Dependent of change of origin but not of scale.

(d) Independent of change of origin but not of scale.

16. Given: $\bar{x} = 16, \sigma x = 4.8,\ \bar{y} = 20, \sigma x = 9.6$,**Dec-2010**The coefficient of correlation between x and y is 0.6. What will be the regression coefficient of 'x' on 'y' ?

(a) 0.03 (b) 0.3 (c) 0.2 (d) 0.05

Answer:

(b) bxy = r × $\frac{SDx}{SDy}$

r = 0.6

SDx = 4.8

SDy = 9.6

bxy = 0.6 × $\frac{4.8}{9.6}$ = 0.3

17. For a bivariable data, two lines of regression are 40x – 18y = 214 and 8x – 10y + 66 = 0, then find the values of $\bar{x}$ *and* $\bar{y}$ **June-2011**

(a) 17 and 13 (b) 13 and 17 (c) 13 and -17 (d) -13 and 17

Answer

(b) Given : 40x – 18y = 214 _____(1)

8x – 10y = -66 _____(2)

On solving (1) and (2) we get

x = 13 and y = 17

$\therefore \bar{x} = 13$ and $\bar{y} = 17$

18. Out of the following which one affects the regression co-efficient. **Dec-2011**

a) Change of Origin Only b) Change of scale Only

c) Change of scale & origin both

d) Neither Change of origin nor change of scale

19. For a bivariate data, the lines of regression of Y on X, and of X on Y are respectively 2.5Y – X = 35 and 10X – Y = 70, then the Correlation coefficient r is equal to: **Dec-2011**

a) 0.2 b) – 0.2 c) 0.5 d) – 0.5

Answer:

(a) The equation of regression line y on x is given by

2.5y - x = 35

2.5y = 35 + x

y = $\frac{x+35}{2.5}$

y = $\frac{x}{2.5} + \frac{350}{25}$

y = 14 + $\frac{2}{5}$ x

On comparing

y = a + bx

we get b = $\frac{2}{5}$ => b_{yx}

Now the equation of Regression line x on y in given by

10x – y = 70

10x = 70 + y

x = $\frac{70+y}{10}$

x = 7 + $\frac{1}{10}$ y

Comparing from x = a + by

we get b = $\frac{1}{10}$ => bxy

coefficient of correlation (r) = $\sqrt{bxy \times byx}$

= $\sqrt{\frac{2}{5} \times \frac{1}{10}}$

= $\sqrt{\frac{1}{25}}$

= $\frac{1}{5}$

= 0.2

20. One of the regression coefficient is _____ unity, other must be _____ unity. **Dec-2011**
a) More than, more than b) Less than, less than
c) More than, less than d) Positive, Negative

21. If Y is dependent variable and X is Independent variable and the S.D. of X and Y are 5 and 8 respectively and Co-efficient of co-relation between X and Y is 0.8. Find the Regression coefficient of y on X. **Dec-2011**
a) 0.78 b) 1.28 c) 6.8 d) 0.32

Answer:

(b) Given
S.D. of x $(\sigma_x) = 5$
S.D. of y $(\sigma_y) = 8$
Co-eff. of Correlation (r) = 0.8
Regression Co-eff of y on x
$b_{yx} = r \cdot \frac{\sigma_y}{\sigma_x} = \frac{0.8 \times 8}{5} = \frac{6.4}{5} = 1.28$

22. The coefficient of correlation between two variable x and y is the simple _____ of the two regression coefficients. **June-2012**
(a) Arithmetic Mean (b) Geometric Mean (c) Harmonic Mean (d) None of the above.

23. If 2 variables are uncorrelated, their regression lines are: **June-2012**
(a) Parallel (b) Perpendicular
(c) Coincident (d) Inclined at 45 degrees.

24. If $\bar{x}, \bar{y}$ denote the arithmetic means, σ_x, σ_y denotes the standard deviations. b_{xy}, b_{yx} denote the regression coefficients of the variables 'x' and 'y' respectively, then the point of intersection of regression lines x on y & y on x is _____ **June-2012**
a) $(\bar{x}, \bar{y})$ b) (σ_x, σ_y) c) (b_{xy}, b_{yx}) d) (σ_x^2, σ_y^2)

25. If y = 18x + 5 is the regression line of y on x value of b_{xy} is **Dec-2012**
(a) 5/18 (b) 18 (c) .5 (d) 1/18

Answer:
(d) If
If $y = 18x + 5$
$18x = -5 + y$
$x = \frac{-5 + y}{18}$
$x = \frac{-5}{18} + \frac{1}{18}y$
$x = a + by$
We get $b = b_{xy} = 1/18$

26. If 'r' be the Karl Pearson's coefficient of correlation in a bivariate distribution then the two regression lines are at right angle if: **June-2013**
a) r = ±1 b) r = 0
c) r = ± any finite value whose numerical value is less than 1 d) None of these

27. When the value of correlation is +1 or –1, then the two regression lines will _____ **Dec-2013**
(a) have 30° angle between them (b) have angle between them
(c) coincide (d) be perpendicular to each other.

28. If the mean of two variables 'x' & 'y' are 3 and 1 respectively. Then the equation of two regression lines are _____ **June-2014**
a) 5x + 7y – 22 = 0, 6x + 2y – 20 = 0 b) 5x + 7y –22 = 0, 6x + 2y + 20 = 0
c) 5x + 7y + 22 = 0, 6x + 2y – 20 = 0 d) 5x + 7y + 22 = 0, 6x + 2y + 20 = 0

Answer:

(a) The equation of two Regression lines are
5x + 7y – 22 = 0, 6x + 2y – 20 =0
by solving these equations we get.
x = 3 & y = 1

So $\bar{x} = 3$, & $\bar{y} = 1$

(The Intersection of two regression lines are $\bar{x}, \bar{y}$).

29. If the correlation between two variables is zero, then the lines of regression are: **Dec-2014**

a) Parallel b) Perpendicular c) Coincide d) None of these

30. The equations of two regression lines are x + y = 6 and x + 2y = 10, then the value of correlation coefficient between x and y is : **Dec-2014**

a) -1/2 b) +1/2 c) $-1/\sqrt{2}$ d) $+1/\sqrt{2}$

Answer:

(c) Given two Regression lines:

x + y = 6 and x + 2y = 10

x + y – 6 = 0 x + 2y – 10 = 0

$b_{xy} = \frac{-Coeff.of\ y}{Coeff.of\ x}$ $b_{yx} = \frac{-Coeff.of\ x}{Coeff.pf\ y}$

$= \frac{-1}{1} = -1$ $= \frac{-1}{2}$

$r = \pm\sqrt{b_{xy}} \times b_{yx} = \pm\sqrt{(-1)\left(\frac{-1}{2}\right)} = -\frac{1}{\sqrt{2}}$

31. Out of following which is correct? **Dec-2015**

a) $b_{yx} = r\frac{\sigma_x}{\sigma_y}$ b) $b_{yx} = r\frac{\sigma_y}{\sigma_x}$ c) $b_{yx} = \frac{\pi.\sum xy}{\sigma_x}$ d) $b_{yx} = \frac{\pi.\sum xy}{\sigma_y}$

Answer:

(b) $byx = \frac{r \cdot \sigma_y}{\sigma_x}$

Where σ_y = S.D. of y, σ_x = S.D. of x r = Coeff. of Correlation

32. Two regression equations are Regression equation of x on y: 5x – y = 22 **June-2016**

Regression equation of y on x : 64x – 45y = 24 What will be the mean of x and y?

a) $\bar{x} = 8, \quad \bar{y} = 6$ b) $\bar{x} = 6, \quad \bar{y} = 6$ c) $\bar{x} = 6, \quad \bar{y} = 8$ d) $\bar{x} = 8, \quad \bar{y} = 8$

nswer:

(c) Given Regression Equations

5x – y = 22 ……(1)

64x – 45y = 24 ……(2)

Multiply by 45 in equation (1) we get

225x – 45y = 990 ……(3)

equation (3) – equation (2)

225x – 45y = 990

64x – 45y = 24

– + –

161x = 966

x = 6

Putting x = 6 in equation (1)

5 × 6 – y =22

30 – y = 22

y = 8

$\bar{x}$ = x = 6

$\bar{y}$ = y = 8

33. If the coefficient of correlation between X and Y variables is +0.90 then what will be the coefficient of determination? **June-2016**

a) 0.30 b) 0.81 c) 0.94 d) None of these

Answer:

(b) If Coeff. of Correlation (r) = 0.90

Coeff. of Determination = r^2

$= (0.90)^2$

= 0.81

34. The two lines of regression become identical when **June-2016**

a) r = 1 b) r = – 1 c) r = 0 d) (a) r (b)

Answer:

(d) If r = –1 or +1 then two lines of Regression become identical.

35. If r = 0.6, then the coefficient of determination is . **June-2016**

a) 0.4 b) – 0.6 c) 0.36 d) 0.64

Answer:

(c) If r = 0.6

Then Coeff. of determination = r^2

$= (0.6)^2$

$= 0.36$

36. The two regression lines passing through **Dec-2016**

(a) Respective means (b) Respective S.Ds (c) Both (d)None of these

37. Out of the following the one which effects the regression coefficient is **Dec-2016**

(a) Change of origin only (b) Change of scale only

(c) Change of scale and origin both (d)Neither change in origin nor change of scale

38. The regression equation x and y is 3x + 2y =100, the value of bxy **Dec-2016**

(a) -2/3 (b) 100/3 (c) 3/2 (d) 2/3

Answer:

(a) The regression equation of x on y is 3x + 2y = 100.

The standard equation of x on y is of the form $x = a + b_{xy}y$

We have $3x = 100 - 2y \Rightarrow x = \frac{100}{3} - \frac{2}{3}y$

Comparing this with the standard form, we have $b_{xy} = -\frac{2}{3}$

39. If the two regression lines are 5y = 9x - 22 and 20 x = 9y + 350, then the value of correlation coefficient (r) will be **Dec-2017**

a. 0.10 b. -0.10 c. - 0.90 d. 0.90

Answer:

(d) Given two regression lines are

$5y = 9x - 22 - - - - - - - - (1)$

$9x - 5y - 22 = 0$

$byx = \frac{-\text{ coeff. of } x}{\text{coeff. of y}} = \frac{-9}{-5}$

$byx = \frac{9}{5}$

$r = \pm\sqrt{byx x bxy}$

and $20x = 9y + 350 - - - - - - - - - (2)$

and $20x - 9y - 350 = 0$

and $bxy = \frac{-\text{ coeff. of } y}{\text{coeff. of } x}$

$bxy = \frac{-(-9)}{20} = \frac{9}{20}$

$= \pm\sqrt{\frac{9}{5} \times \frac{9}{20}}$

$= \pm\sqrt{\frac{81}{100}}$

$= +\left(\frac{9}{10}\right) = +0.90$

40. The coefficient of determination is defined by the formula **May-2018**

(a) $r^2 = \frac{1 - unexplained\ variance}{total\ variance}$ (b) $r^2 = \frac{explained\ variance}{total\ variance}$

(c) both (a) and (b) (d) none

41. The two line of regression intersect at the point **Nov-2018**

(a) Mean (b) Mode (c) Median (d) None of these

42. If the two regression lines are 3X = Y and 8Y = 6X, then the value of correlation coefficient is **Nov-2018**

(a) 0.5 (b) - 0.5 (c) 0.75 (d) 0.80

Answer:

(a) Let By = 6x be the equation of y on x

The standard equation of y on x is of the form $y = a+b_{yx}\,x$.

We have By = 6x $y = \frac{6}{8}x$ $y = 0 + \frac{6}{8}x$

Comparing this with the standard form, we have $b_{yx} = \frac{6}{8}$

Also, let 3x = y be the equation of x on y.

The standard equation of x on y is of the form $x = a + b_{xy}y$

We have 3x = y $x = \frac{1}{3}y$ $x = 0 + \frac{1}{3}y$

Comparing this with the standard form, we have $b_{xy} = \frac{1}{3}$

Since both the regression coefficients are positive, $r = \sqrt{b_{yx} \times b_{xy}}$

$r = \sqrt{b_{yx} \times b_{xy}} = \sqrt{\frac{6}{8} \times \frac{1}{3}} = 0.5$

Since r lies between –1 and 1, our assumption is correct and therefore,

By = 6x is the equation of y on x.

43. A.M. of regression coefficients is **June-2019**

(a) Equal to r (b) Greater than or equal to r

(c) Half of r (d) None

44. Find the probable error if $r = \frac{2}{\sqrt{10}}$ and n = 36 **June-2019**

(a) 0.6745 (b) 0.067 (c) 0.5287 (d) None

Answer:

(b) $r = \frac{2}{\sqrt{10}}$, n = 36, P.E = ?

Probable Error $P.E = \frac{2}{3}\,S.E$

$$= \frac{2}{3}\frac{1-r^2}{\sqrt{n}}$$

$$= \frac{2}{3}\left[\frac{1-\left(\frac{2}{\sqrt{10}}\right)^2}{\sum 36}\right]$$

$$= \frac{2}{3}\frac{\left(1-\frac{4}{10}\right)}{6}$$

$$= \frac{2}{3} \times \frac{\cancel{6}}{10\times\cancel{6}}$$

$$= \frac{1}{15}$$

$$= 0.067$$

45. If two line of regression are x + 2y – 5 = 0 and 2x + 3y – 8 = 0. So x + 2y – 5 = 0 is regression line **Nov-2019**

(a) y on x (b) x on y (c) both (d) None

Answer:

(a) x + 2y -5 = 0 _____ Eq. 1 2x + 3y -8 = 0 _____Eq. 2

Let Eq 1 be y on x from Eq 2

$b_{yx} = \frac{-coeff\,of\,x}{coeff\,of\,y}$ $b_{xy} = \frac{-coeff\,of\,y}{coeff\,of\,x}$

$b_{yx} = \frac{-1}{2}$ $b_{xy} = \frac{-3}{2}$

$b_{yx} \times b_{xy} = \left(\frac{-1}{2}\right) \times \left(\frac{-3}{2}\right) = \frac{3}{4}$

So, $b_{yx} \times b_{xy} < 1$

So, x + 2y – 5 = 0 is y on x

and 2x + 3y – 8 = 0 is x on y.

46. Find the coefficient of correlation 2x + 3y = 2 4x + 3y = 4. **Nov-2019**

(a) 0.5 (b) $-\sqrt{0.5}$ (c) 0.25 (d) – 0.25

47. The intersecting point of the two regression lines: y on x and x on y is **Jan – 2021**

(a) (0 , 0) (b) $(\bar{x}, \bar{y})$ (c) (b_{yx}, b_{xy}) (d) (1, 1)

Answer:

(b) The Intersection point of two regression lines y on x and x on y is $(\bar{x},\bar{y})$

48. Given that the variance of x is equal to the square of standard deviation by and the regression line of y on x is y = 40 + 0.5 (x-30). The regression line of x on y is **Jan – 2021**

(a) y = 40 + 4 (x – 30) (b) y = 40 + (x – 30) (c) y = 40 + 2(x – 30) (d) x = 30 + 2 (y - 40)

Answer:

(d) Here Regression Equation of line y on x

y = 40 + 0.5 (x – 30)

(y - 40) = 0.5 (x – 30)

Comparing from $(y - \bar{y}) = b_{yx} (x - \bar{x})$

we get $\bar{x} = 30$, $\bar{y} = 40$, $b_{yx} = 0.5$

we know that

$b_{yz} \times b_{xy} = 1$

$b_{xy} = \frac{1}{b_{yz}} = \frac{10}{0.5} = 2$

$\boxed{b_{xy} = 2}$

49. The regression coefficients remain unchanged due to **Jan – 2021**

(a) A shift of scale (b) A shift of origin

(c) Replacing x – values by 1/x (d) Replacing y values by 1/y

50. The straight -line graph of the linear equation y = a + b x, slope is horizontal if: **July – 2021**

(a) b = 1 (b) b ≠ 0 (c) b = 0 (d) a = b ≠ 0

Answer:

(c) Given line y – a + bx

slope of horizontal if b = 0

51. If byx = -1.6 and bxy = -0.4, then r_{xy} will be: **July – 2021**

(a) 0.4 (b) -0.8 (c) 0.64 (d) 0.8

Answer:

(b) $r_{xy} = \pm\sqrt{b_{yx} \times b_{xy}}$

$= \pm\sqrt{(-1.6) \times (-0.4)}$

$= -\sqrt{0.64}$

= - 0.8

52. If the slope of the regression line is calculated to be 5.5 and the intercept 15 then the value of Y when X is 6 is: **July – 2021**

(a) 88 (b) 48 (c) 18 (d) 78

Answer:

(b) Here b = 5.5 , a = 15

Then regression equation of line

y = a + bx

y = 15 + 5.5x

but x = 6

y = 15 + 5.5 × 6

= 15 + 33

y = 48

53. For any two variables x and y the regression equations are given as 2x +5y – 9 = 0 and 3x – y – 5 = 0, What are the A.M of x and y ? **Dec 2021**

(a) 2, 1 (b) 1, 2 (c) 4, 2 (d) 2, 4

54. The intersecting point of two regression lines falls at X-axis. If the mean of X- values is 16, the standard deviations of X and Y are respectively, 3 and 4, then the mean of Y- Values is **Dec 2021**

(a) 16/3 (b) 4 (c) 0 (d) 1

55. The regression coefficients remain unchanged due to **Dec 2021**

(a) shift of origin (b) Shift of scale (c) Always (d) Never

56. The equations of the two lines of regression are 4x + 3y + 7 = 0 and 3x + 4y + 8 = 0. Find the correlation coefficient between x and y? **Dec 2022**

(a) – 0.75 (b) 0.25 (c) -0.92 (d) 1.25

Answer:

(a) Given two Equations of Regression lines are:

$4x + 3y + 7 = 0$ and $3x + 4y + 8 = 0$

$bxy = \frac{-coeff\,of\,y}{coeff\,of\,x}$ and $byx = \frac{-coeff\,of\,x}{coeff\,of\,y}$

$bxy = \frac{-3}{4}$ $byx = \frac{-3}{4}$

Coeff. of correlation is given by:

$r = \pm\sqrt{byx \times bxy}$

$= \pm\sqrt{(-3/4) \times (-3/4)}$

$= -\sqrt{\frac{3}{16}}$

$= \frac{-3}{4}$

r = -0.75

57. The regression equations are 2x + 3y + 1 = 0 and 5x + 6y + 1 = 0, then Mean of x and y respectively are: **Dec 2022**

(a) -1,-1 (b) -1, 1 (c) 1, -1 (d) 2,3

Answer:

(c) Given Regression Equations are:

2x + 3y + 1 = 0 => 2x + 3y = -1 _____(1)

and 5x + 6y + 1 = 0 => 5x + 6y = -1 _____(2)

multiply by (2) in eq. (1) we get

4x + 6y = -2 _____(3)

eq.(2) – eq.(3)

5x + 6y = -1

4x + 6y = -2

\- - + +

x = 1

Putting x = 1 in equation (1)

2 × 1 + 3y = -1

2 + 3y = -1

3y = -1 -2

3y = -3

y = -1

Ans. x = 1, y = -1

58. If $b_{yx} = 0.5$, $b_{xy} = 0.46$ then the value of correlation coefficient r is: **Dec 2022**

(a) 0.23 (b) 0.25 (c) 0.39 (d) 0.48

Answer:

(d) Given byx = 0.5 , bxy = 0.46 find r = ?

Coeff. of correlation

$r = \pm\sqrt{byx \times bxy}$

$= \pm\sqrt{0.5 \times 0.46}$

$= + \sqrt{0.23}$

$= + 0.48$

59. If the regression equations are x+2y-5=0 and 2x+3y-8=0then the r, x and the mean of y are _____ respectively. **June 2023**

(a) -3&4 (b) -2&4 (c) 1&2 (d) 2&1

Answer :

(c) Given two Regression Equation

x + 2y – 5 = 0 and 2x + 3y – 8 = 0

x + 2y = 5 ----------(1) and 2x + 3y = 8 ----------(2)

From equation (1)

x + 2y = 5

2y = 5 – x

x = 5 – 2y ----------(3)

Puting the value of x in eq (2)

2(5–2y) + 3(y) = 8

10 – 4y + 3y = 8

10 – y = 8

y = 10 – 8

$\boxed{y=2}$

Puting y = 2 in eq (3)

x = 5 – 2 × 2

= 5 – 4

= 1

Mean of x = 1 and Mean of y = 2

60. The regression lines will be perpendicular to each other when the value of r is **June 2023**

(a) 1 (b) -1 (c) ½ (d) 0

Answer :

(d) The regression lines will be perpendicular to each other when $\boxed{r = 0}$

61. For variables X and Y for a set of four observation , X=10, Y=14, X^2 =65 Y^2 =99 and XY=3 ,then the regression line on Y on X is : **June 2023**

(a) Y= -0.8X-5.5 (b) Y= 0.8X -5.5 (c) Y= -0.8X+5.5 (d) Y= 0.8X +5.5

Answer :

(c) Here x = 10 , y = 14 , x2 = 65 , y2 = 99

xy = 3 , N = 4

$\bar{x} = \frac{\sum x}{N} = \frac{10}{4} = 2.5$

$\bar{y} = \frac{\sum y}{N} = \frac{14}{4} = 3.5$

byx = $\frac{N\sum xy - \sum x.\sum y}{N\sum x^2 (\sum x)^2}$

$= \frac{4\times3-10\times14}{4\times65-(10)^2}$

$= \frac{12-140}{260-100} = \frac{128}{160} = -0.8$

Regression equation of line y on x

y–y = byx(x–x)

y – 3.5 = – 0.8(x–2.5)

y – 3.5 = – 0.8x + 2

y = – 0.8x + 5.5

62. If the regression line of y on x and x on y are given by 10x-290 = -20y and 7y – 104 = -4x. Then the arithmetic means of x and y are given by: **dec 2023**

(a)5,12 (b)7,12 (c)12,5 (d)5,7

Answer:

(a) Given two regression equation

10x – 290 = -20y 10x + 20y = 290 _____(1)

$7y - 104 = -4x$ $\quad 4x + 7y = 104$ _____(2)

Solving equation (1) & (2) we get

$x = 5$, $y = 12$

Mean of x = x = 5

Mean of y = y = 12

63. If the coefficient of correlation is 0.8 and regression coefficient b_{yx} ? **dec 2023**

(a) 2 (b) 1 (c) 0.52 (d) 0.48

Answer:

(a) Given Coeff. of correlation (r) = 0.8.

$b_{xy} = 0.32$

$b_{yx} = ?$

We know that

$r = \pm\sqrt{b_{yx} \times b_{xy}}$

$r^2 = b_{yx} \times b_{xy}$

$(0.8)^2 = b_{yx} \times 0.32$

$b_{yx} = \frac{(0.8)^2}{0.32} = \frac{0.8 \times 0.8}{0.32} = 2$

64. If the Regression coefficient (r_{yx})of y on x is greater than unity, then other Regression coefficient (r_{xy}) of x on y is: **dec 2023**

(a) Less than one (b) Greater than one (c) Equal to one (d) Equal to zero

Answer:

(a) If the Regression Coefficient y on x is greater than unity, then other Regression Coefficient of x on y is less than one.

65. If 4y – 6x = 18 is regression line of y on x and coefficient of correlation between x and y is 0.8. What is the value of regression coefficient of x on y ? **dec2023**

(a) 0.24448 (b) 0.4267 (c) 0.5733 (d) 0.7441

Answer:

(b) Given the Regression Equation of line y on x is

$4y - 6x = 18$

$6x - 4y + 18 = 0$

Then $b_{yx} = \frac{-\text{Coeff.of}x}{\text{Coeff.of}y} = \frac{-6}{-4} = 1.5$

and $b_{xy} = 0.8$

Then $r = \pm\sqrt{b_{yx} \times b_{xy}}$

$0.8 = \pm\sqrt{1.5 \times b_{xy}}$

$(0.8)^2 = 1.5 \times b_{xy}$

$0.64 = 1.5 \times b_{xy}$

$b_{xy} = \frac{0.64}{1.50} = 0.4267$

Answer Key																			
1.	d	2.	d	3.	d	4.	c	5.	d	6.	c	7.	d	8.	c	9.	b	10.	a
11.	b	12.	a	13.	d	14.	a	15.	d	16.	b	17.	d	18.	b	19.	a	20.	c
21.	b	22.	b	23.	b	24.	a	25.	d	26.	b	27.	c	28.	a	29.	b	30.	c
31.	b	32.	c	33.	b	34.	d	35.	c	36.	a	37.	b	38.	a	39.	d	40.	b
41.	a	42.	a	43.	b	44.	b	45.	a	46.	b	47.	b	48.	d	49.	b	50.	c
51.	b	52.	b	53.	a	54.	c	55.	a	56.	a	57.	c	58.	d				

CHAPTER
PROBABILITY

PAST YEAR QUESTIONS

1. There are six slips in a box and numbers 1, 1, 2, 2, 3, 3 are written on these slips. Two slips are taken at random from the box. The expected values of the sum of numbers on the two slips is : **Nov-2006**

(a) 5 (b) 3 (c) 4 (d) 7

2. A letter is taken out at random from the word RANGE and another is taken out from the word PAGE. The probability that they are the same letters is : **Nov-2006**

(a) 1/20 (b) 3/20 (c) 3/5 (d) ¾

3. An urn contains 9 balls two of which are red, three blue and four black. Three balls are drawn at random. The probability that they are of same colour is: **Nov-2006**

(a) 3/27 (b) 20/31 (c) 5/84 (d) None

4. A card is drawn from a well shuffled pack of 52 cards. Let E_1, "a king or a queen is drawn" & E_2 : "a queen or a jack is drawn", then : **Nov-2006**

(a) E_1 and E_2 are not mutually exclusive. (b) E_1 and E_2 are mutually exclusive

(c) E_1 and E_2 are independent (d) None of these

5. In a non - leap year, the probability of getting 53 Sundays or 53 Tuesdays or 53 Thursdays is : **Nov-2006**

(a) 4/7 (b) 2/7 (c) 3/7 (d) 1/7

6. From a pack of cards, two are drawn, the first being replaced before the second is drawn. The chance that the first is a diamond and the second is king is : **May-2007**

(a) 1/52 (b) 3/2704 (c) 4/13 (d) 3/52

7. The probability of getting qualified in IIT- JEE and AIEEE by a the student are respectively 1/5 and 3/5. The probability that the student gets qualified for one of the these tests is : **May-2007**

(a) 14/25 (b) 22/25 (c) 8/25 (d) 3/25

8. Amitabh plays a game of tossing a dice. If the number less than 3 appears, he is getting ₹ a, otherwise he has to pay ₹ 10. If the game is fair, find a : **May-2007**

(a) 25 (b) 20 (c) 22 (d) 18

9. Suppose E and F are two events of a random experiment. If the probability of occurrence of E is 1/5 and or probability of occurrence of F given E is 1/10, then the probability of nonoccurrence of at least one of the events E and F is : **Aug-2007**

(a) 1/50 (b) 1/25 (c) 13/50 (d) 49/50

10. Among the examinees in an examination 30%, 35% and 45% failed in Statistics, in Mathematics and in at least one of the subjects respectively. An examinee is selected at random. Find the probability that he failed in Mathematics only : **Nov-2007**

(a) 0.15 (b) 0.25 (c) 0.254 (d) 0.55

11. An article consists of two parts A and B. The manufacturing process of each part is such that probability of defect in A is 0.08 and that B is 0.05. What is the probability that the assembled product will not have any defect? **Nov-2007**

(a) 0.934 (b) 0.864 (c) 0.85 (d) 0.874

12. Daily demand for calculators is having the following probability distribution : **Nov-2007**

Demand :	1	2	3	4	5	6
Probability :	0.10	0.15	0.20	0.25	0.18	0.12

Determine the variance of the demand.

(a) 2.54 (b) 2.93 (c) 2.22 (d) 2.19

13. If 10 men, among whom are A and B, : stand in a row, what is the probability that there will be exactly 3 men between A and B ? **Feb-2008**

(a) 11/15 (b) 4/15 (c) 1/15 (d) 2/15

14. The odds are 9 : 5 against a person who is 50 years living till he is 70 and 8 : 6 against a person who is 60 living till he is 80. Find the probability that at least one of them will be alive

after 20 years: **Feb-2008**

(a) 11/14 (b) 22/49 (c) 31/49 (d) 35/49

15. If P(A) = p and P (B) = q, then : **June-2008**

(a) P (A / B) $\leq$ q / p (b) P (A / B) $\geq$ p / q (c) P (A / B) $\leq$ p / q (d) P (A / B) $\geq$ q / p

16. The probability that a trainee will remain with a company is 0.8. The probability that an employee earns more than ₹ 20,000 per month is 0.4. The probability that an employee, who was a trainee and remained with the company or who earns more than ₹ 20,000 per month is 0.9.What is the probability that an employee earns more than ₹ 20,000 per month given that he is a trainee, who stayed with the company? **June-2008**

(a) 5/8 (b) 3/8 (c) 1/8 (d) 7/8

17. A random variable X has the following probability distribution : **June-2008**

X :	-2	3	1
P(X = x) :	1/3	1/2	1/6

Find E (X^2) and E (2X + 5)

(a) 6 and 7 respectively (b) 5 and 7 respectively

(c) 7 and 5 respectively (d) 7 and 6 respectively

18. If a probability density function is $f(x) = \begin{cases} 1 \; if \; 0 < x < 1 \\ 0 \; otherwise \end{cases}$ *then find* $E(x)$ **Dec-2008**

(a) ∞ (b) 0 (c) $\frac{1}{2}$ (d) - ∞

19. Then find E (2x + 5) **Dec-2008**

(a) 7 (b) 6 (c) 9 (d) 4

20. If A and B are two independent evens and P(AUB) = 2/5; P(B) = 1/3. Find P(A). **June-2009**

(a) 2/9 (b) -1/3 (c) 2/10 (d) 1/10

21. A bag contains 12 balls of which 3 are red 5 balls are drawn at random. Find the probability that in 5 balls 3 are red. **June-2009**

(a) 3/132 (b) 5/396 (c) 1/36 (d) 1/22

Answer:

(d) Total number of cases of drawing 5 balls out of 12 balls = $^{12}C_5$

Cases when out of 5 balls drawn , 3 are red = $^5C_3$

If 3 are red, then the other 2 balls may be of any colour which may be drawn from remaining 9 balls.

Therefore, the cases are $^9C_2$.

So, the probability that in 5 balls 3 are red

$= \frac{C_3^3 \times C_2^9}{C_5^{12}} = \frac{1 \times 36}{792} = \frac{1}{22}$

22. A random variable X has the following probability distribution. **June-2009**

X	0	1	2	3
P(x)	0	2K	3K	K

Then, P (x < 3) would be:

(a) 1/6 (b) 1/3 (c) 2/3 (d) 5/6

Answer:

(d) Since $\sum P(x) = 1$

therefore, 0+ 2k +3k + k = 1

6k = 1

k = $\frac{1}{6}$

P(x<3) = P(x=0) + P(x=1) +P(x=2)

= 0 + 2k + 3k = 5k

= 5 × $\frac{1}{6}$ (as k = $\frac{1}{6}$) = $\frac{5}{6}$

23. P(A) = 2/3; P(B) = 3/5; P(A∪B) = 5/6. Find P (B/A) **Dec-2009**

(a) 11/20 (b) 13/20 (c) 13/18 (d) None

Answer:

(b) P(A) = 2/3

P(B) = 3/5

$P(A \cup B) = 5/6$

$P(A)+P(B) - P(A \cap B) = P(A \cup B)$

$\frac{2}{3} + \frac{3}{5} - P(A \cap B) = \frac{5}{6}$

$\frac{10+9}{15} - P(A \cap B) = \frac{5}{6}$

$P(A \cap B) = \frac{19}{15} - \frac{5}{6}$

$P(A \cap B) = \frac{38-25}{30} = \frac{13}{30}$

Now, $P(B/A) = \frac{P(A \cap B)}{P(A)} = \frac{\frac{13}{30}}{\frac{2}{3}} = \frac{13}{30} \times \frac{2}{3} = \frac{13}{20}$

$\therefore P(B/A) = \frac{13}{20}$

24. In a pack of playing cards with two jokers probability of getting king of spade is **June-2010**

(a) 4/13 (b) 4/52 (c) 1/52 (d) 1/54

Answer:

(d) Pack of playing cards contain 52 cards + 2 Jokers = Total cards are 54

Total no. of spade king = 1

$\therefore$ Probability of getting spade king = $\frac{1}{54}$

25. Consider two events A and B not mutually exclusive, such that P(A) = 1/4, P(B) = 2/5, $P(A \cup B) = \frac{1}{2}, then\ P(A\bar{B})$is **June-2010**

(a) 3/7 (b) 2/10 (c) 1/10 (d) None of the above

Answer:

(d) Since the two events are not mutually exclusive, they are independent events. The events A and B are

independent if $P(AB) = P(A) \cdot P(B)$

$\therefore P(A\bar{B}) = P(A) \cdot P(\bar{B})$

$= P(A) \cdot [1- P(B)]$

$= \frac{1}{4} \cdot \left(1 - \frac{2}{5}\right)$

$= \frac{1}{4} \cdot \frac{3}{5}$

$= \frac{3}{20}$

Moreover,

$P(A\ 1B) = P(A) + P(B) - P(A \cup B)$

$\frac{1}{4} + \frac{2}{5} - \frac{1}{2} = \frac{3}{20}$

Note : In case of independent events, the multiplication theorem becomes.

$P(A \cap B) = P(A) \times P(B)[\because P(A/B) = P(A) \text{and} P(B/A) = P(B)]$

26. If x be the sum of two numbers obtained when two die are thrown simultaneously then P(x $\geq$ 7) is **June-2010**

(a) 5/12 (b) 7/12 (c) 11/15 (d) 3/8

Answer:

(b) While, throwing two dice

Total no. of outcomes = 36

Probability of sum = 7 is $\frac{6}{36}$

Probability of sum = 8 is $\frac{5}{36}$

Probability of sum = 9 is $\frac{4}{36}$

Probability of sum = 10 is $\frac{3}{36}$

Probability of sum = 11 is $\frac{2}{36}$

Probability of sum = 12 is $\frac{1}{36}$

$\therefore$ Required Probability = $\frac{21}{36} = \frac{7}{12}$

27. E (13x +9) = _____. **June-2010**

(a) 13x (b) 13E(x) (c) 13E(x) + 9 (d) 9

Answer:

(c) E(x+y) = E(x) + E(y)

∴ E(13x + 9) = 13E(x) + E(9)

= 13E(x) + 9 [∴ E(K) = K for any constant K]

28. A dice is thrown once. What is the mathematical expectation of the number on the dice ? **Dec-2010**

(a) 16/6 (b) 13/2 (c) 3.5 (d) 4.5

Answer:

(c)

x	P(x)	x.p(x)
1	1/6	1/6
2	1/6	2/6
3	1/6	3/6
4	1/6	4/6
5	1/6	5/6
6	1/6	6/6
	1	21/6

Expected value = $\frac{\sum xp(x)}{\sum p(x)} = \frac{21}{6} = 3.5$

29. If P(A/B) = P(A), then A and B are **Dec-2010**

(a) Mutually exclusive events (b) Dependent events

(c) Independent events (d) Composite events

Answer:

(c) P(A/B) = P(A)

$P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{P(A)P(B)}{P(B)} = P(A)$

Since, $P(A \cap B) = P(A)\,P(B)$

30. If $P(A \cup B) = P(A), Find\ P(A \cap B)$ **June-2011**

(a) P(A).P(B) (b) P(A) + P(B) (c) 0 (d) P(B)

Answer:

(d) Given : $P(A \cup B) = P(A)$

we know,

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

∴ we get $P(A \cap B) = P(B)$

31. In how many ways a team of 5 can be made out of 7 Boys and 8 Girls, if 2 Girls are compulsory to form a Team. **June-2011**

(a) 2,646 (b) 1,722 (c) 2,702 (d) 980

32. The probability of Girl getting scholarship is 0.6 and the same probability for Boy is 0.8. Find the probability that at least one of the categories getting scholarship. **June-2011**

(a) 0.32 (b) 0.44 (c) 0.92 (d) None of the above.

Answer:

(c) Probability of Girl getting scholarship P(A) = 0.6

Probability of Boys getting scholarship P(B) = 0.8

Requried to find:

⇨ $P(\bar{A} \cap B) + (A \cap \bar{B}) + P(A \cap B)$

$= P(\bar{A})\,P(B) + P(A) \cdot P(\bar{B}) + P(A) \cdot P(B)$

$= [1\text{-}P(A)] \cdot P(B) + P(A) \cdot [1 - P(B)] + P(A) \cdot P(B)$

$= (1\text{-}0.6)(0.8) + 0.6(1\text{-}0.8) + 0.6 \times 0.8$

$= 0.32 + 0.12 + 0.48$

$= 0.92$

33. Two unbiased dice are thrown. The Expected value of the sum of numbers on the upper side

is; **Dec-2011**

a) 3.5 b) 7 c) 12 d) 6

Answer:

(b) According to the formula of Addition Law of Expectation

$E(x+y) = E(x) + E(y)$

∴ Expectation of a number on a dice:

$E(x) = p_1x_1 + p_2x_2 + p_3x_3 + \ldots\ldots + p_6x_6$

$= \left[\frac{1}{6}\right] \times 1 + \left[\frac{1}{6}\right] \times 2 + \left[\frac{1}{6}\right] \times 3 + \left[\frac{1}{6}\right] \times 4 + \left[\frac{1}{6}\right] \times 5 + \left[\frac{1}{6}\right] \times 6$

$= \frac{1}{6}(1 + 2 + 3 + 4 + 5 + 6) = \frac{7}{2}$

∴ Expectation of a number on a dice $= \frac{7}{2}$

∴ $E(x) = \frac{7}{2}$; $E(y) = \frac{7}{2}$ (since IInd dice will also give same result)

∴ $E(x+y) = E(x) + E(y) = \frac{7}{2} + \frac{7}{2} = 7$

34. In a packet of 500 pens, 50 are found to be defective. A pen is selected at random. Find the probability that it is non defective. **Dec-2011**

a) 8/9 b) 7/8 c) 9/10 d) 2/3

Answer:

(c) Total pen in the packet = 500

No. of defective pen = 50

No. of Non-defective pen = 500-50 = 450

If a pen is selected sample space $n(s) = {}^{500}C_1 = 500$

Event (A) = 'pen is non defective' $n(A) = {}^{450}C_1 = 450$

P(non defective pens) $= \frac{n(A)}{n(S)} = \frac{450}{500} = \frac{9}{10}$

35. Four married couples have gathered in a room. Two persons are selected at random amongst them, find the probability that selected persons are a gentleman and a lady but not a couple. **Dec-2011**

a) 1/7 b) 3/7 c) 1/8 d) 3/8

Answer:

(b) Total person = 4 married couples = 4×2 = 8

Two person are selected then sample space $n(s) = {}^8C_2$

Event(A) = Selected persons are a gentle man and a lady, but not couple.

$n(A) = {}^4C_1 \times {}^3C_1$

$P(A) = \frac{n(A)}{n(S)} = \frac{4\times3}{28} = \frac{3}{7}$

36. Let A and B two events in a sample space S such that $P(A) = \frac{1}{2}; P(\bar{B}) = \frac{5}{8}, P(A \cup B) = \frac{3}{4}$ Find $P(\bar{A} \cup \bar{B})$ **June-2012**

(a) 3/4 (b) 1/4 (c) 3/16 (d) None of these.

Answer:

(b) Given $P(A) = \frac{1}{2}$, $P(B) = \frac{5}{6}$ and $P(A \cup B) = \frac{3}{4}$ then we know that

$P(\bar{A} \cap \bar{B}) = P(\overline{A \cup B})$

$= 1 - P(A \cup B)$

$= 1 - \frac{3}{4}$

$= \frac{1}{4}$

37. A card is drawn out of a standard pack of 52 cards. What is the probability of drawing a king or red colour ? **June-2012**

(a) 1/4 (b) 4/13 (c) 7/13 (d) 1/2

Answer:

(c) A Card is drawn out of a standard pack of 52 cards,

Then

Sample space n (s) $= {}^{52}C_1 = 52$

Event (A) = 'King or Red Colour'

n (A) = 4 + 24
= 28

Probability P (King or Red Colour) = $\frac{n(A)}{n(S)}$
= $\frac{28}{52}$
= $\frac{7}{13}$

38. A player tosses two fair coins, he wins ₹ 5 if 2 heads appear, ₹ 2 if one head appears and ₹ 1 if no head occurs. Find his expected amount of winning. **June-2012**

(a) 2.5 (b) 3.5 (c) 4.5 (d) 5.5

Answer:

(a) For tossed two coins, the prob. distribution of getting head.

x_1 :	0	1	2
P (x_1) :	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$
Getting amount(Rs,) m_1 :	1	2	5

Expected Amount of winning
E (x) = $\sum m_1 P(x_1)$
= $m_1 P(x_1) + m_2 P(x_2) + m_3 P(x_3)$
= $1 \times \frac{1}{4} + 2 \times \frac{1}{2} + 5 \times \frac{1}{4}$
= 0.25 + 1 + 1.25
= Rs. 2.50

39. A company employed 7 CA's, 6 MBA's and 3 Engineer's. In how many ways the company can form a committee, if the committee has two members of each type. **June-2012**

(a) 900 (b) 1,000 (c) 787 (d) 945

40. Two dice are thrown together. Find the probability of getting a multiple of 2 on one dice and multiple of 3 on the other. **Dec-2012**

(a) 2/3 (b) 1/6 (c) 1/3 (d) None of the above

Answer:

(b) Two dice are thrown together
Sample space n(S) = 36
Event '*E*' = ' getting a multiply of 2 on the 1st Die and multiple of 3 on the lind die'.
= {(2,3) (2,6) (4,3) (4,6) (6,3) (6,6)}
n(E) = 6
p(E) = $\frac{n(E)}{n(S)} = \frac{6}{36} = \frac{1}{6}$

41. The odds against A solving a certain problem are 4 to 3 and the odds in favour of B solving the same problem are 7 to 5. **Dec-2012**
What is the probability that the problem will be solved if they both try?

(a) 15/21 (b) 16/21 (c) 17/21 (d) 13/21

Answer:

(b) The odd against A solving a certain problem = 4:3
P (A) = Prob (Solve the problem) = $\frac{3}{4+3} = \frac{3}{7}$
P $(\overline{A})$ = Prob (not solve the problem) = $\frac{4}{4+3} = \frac{4}{7}$
The odds in favour of B solving the same problem = 7:5
P(B) = Prob(solve the problem) = $\frac{7}{7+5} = \frac{7}{12}$
P(B) = Prob (not solve the problem) = $\frac{5}{7+5} = \frac{5}{12}$
Probability (Both are not solved the problem)
= $P(\overline{A} \cap \overline{B})$
= $P(\overline{A}) \cdot P(\overline{B})$

$= \frac{4}{7} \times \frac{5}{12} = \frac{5}{21}$

Probability (problem is solved) = $1 - \frac{5}{21}$

$= \frac{16}{21}$

42. If P(A) = 0.45, P(B) = 0.35 and P(A&B) = 0.25, then P(A/B) =? **Dec-2013**

(a)1.4 (b)1.8 (c) 0.714 (d) 0.556

43. The probability of a cricket team winning match at Kanpur is 2/5 and losing match at Delhi is 1/7 what is the Probability of the term winning atleast one match? **Dec-2013**

(a) 3/35 (b) 32/35 (c) 18/35 (d) 17/35

Answer:

(b) Prob. of losing a match at Kanpur = $1 - \frac{2}{5} = \frac{3}{5}$

Prob. of winning at least one match =

1 – Prob. of losing both the matches

$= 1 - \frac{3}{5} \times \frac{1}{7} = \frac{32}{35}$

44. Find the expected value of the following probability distribution. **Dec-2013**

X:	-20	-10	30	75	80
P(x):	3/20	1/5	½	1/10	½0

(a) 20.5 (b) 21.5 (c) 22.5 (d) 24.5

Answer:

(b)

x	-20	-10	30	75	80
P(x)	3/20	1/5	½	1/10	1/20

Expected value

$E(x) = \sum p_i x_i$

$= p_1x_1 + p_2x_2 + p_3x_3 + p_4x_4 + p_5x_5$

$= \frac{3}{20} \times (-20) + \frac{1}{5} \times (-10) + \frac{1}{2} \times 30 + \frac{1}{10} \times 75 + \frac{1}{20} \times 80$

= -3 -2 +15 +7.5 +4

= 21.5

45. Two coins are tossed simultaneously. Find the probability of getting exactly one head **Dec-2013**

(a) 3/4 (b) 2/3 (c) 1/4 (d) 1/2

Answer:

(d) Two coins are tossed

Sample Space (S) = {HH, HT, TH, TT}

n(S) = 4

A = 'Exactly are head'

A = HT, TH

n(A) = 2

P(exactly are head) = $\frac{n(A)}{n(S)} = \frac{2}{4} = \frac{1}{2}$

46. An unbiased die is thrown twice. The probability of the sum of numbers obtained on the sum of numbers obtained on the two faces being divisible by 4 is: **Dec - 2014**

a) 7/36 b) 1/3 c) 11/36 d) 1/4

47. A discrete random variable X takes three values -1, 2 and 3 with probabilities **Dec - 2014**

$p(-1) = \frac{1}{3}$, $p(2) = \frac{1}{3}$, $p(3) = \frac{1}{3}$, then $E(|X|)$ is :

a) 3/2 b) 5/2 c) 2 d) 9/2

Answer:

(c) Given,

X_i : -1 -2 -3

P_i : 1/3 1/3 1/3

$E(|x|) = \sum p_i |x|_i$

$= p_1|x_1| + |p_2|x_2| + p_3|x_3|$

$= \frac{1}{3}|-1| + \frac{1}{3}|2| + \frac{1}{3}|3|$

$= \frac{1}{3} \times 1 + \frac{1}{3} \times 2 + \frac{1}{3} \times 3$

$= \frac{1}{3} + \frac{2}{3} + \frac{3}{3}$

$= \frac{6}{3}$

$= 2$

48. An unbiased coin is tossed three times. The expected value of the number of heads is **June-2015**

a) 2.5 b) 1.0 c) 1.5 d) 2.0

49. If an unbiased die is rolled once, the odds in favour of getting a point which is multiple of 3 is : **Dec - 2015**

a) 1 : 2 b) 2 : 1 c) 1 : 3 d) 3 : 1

Answer:

(a) One die is Rolled

Sample space n(S) = 6

Event(A) = 'getting no. which is multiple of 3'

= {3,6}

n(A) = 2

P(A) $= \frac{n(A)}{n(S)} = \frac{2}{6} = \frac{1}{3}$

Odd in favour of an events = P(A) : P($\bar{A}$)

$= \frac{1}{3} : (1 - \frac{1}{3})$

$= \frac{1}{3} : \frac{2}{3}$

= 1:2

50. A bag contains 15 one rupee coins, 25 two rupees coins and 10 five rupees coins, if a coin is selected at random than probability for not selecting a one rupee coin is : **Dec - 2015**

a) 0.30 b) 0.20 c) 0.25 d) 0.70

Answer:

(d) Total No. of coins = 15 + 25 + 10

= 50

Sample Space n(S) = 50

Event 'A' = 'not getting one Rupee coins'

n(A) = 25 + 10

= 35

P(A) $= \frac{n(A)}{n(S)} = \frac{35}{50} = 0.7$

51. Three coins are together, the probability of getting exactly two head is : **Dec - 2015**

a) $\frac{5}{8}$ b) $\frac{3}{8}$ c) $\frac{1}{8}$ d) None

Answer:

(b) Three coins are tossed

then Sample Space S = {HHH, HHT, HTH, HTT, TTT, TTH, THT, THH}

n(S) = 8

Event (A) = 'getting Exactly two head'

{HHT, HTH, THH}

n(A) = 3

P(A) $= \frac{n(A)}{n(S)} = \frac{3}{8}$

52. If two letters are taken at random from the word "HOME", what is the probability that none of the letters would be vowels? **Dec - 2015**

a) $\frac{1}{6}$ b) $\frac{1}{2}$ c) $\frac{1}{3}$ d) $\frac{1}{4}$

Answer:

(a) Given word 'HOME'

If two letters are taken then

Sample Space n(S) = $^4C_2$

$= \frac{4\times3}{2\times1} = 6$

Event(A) 'none of the letters would be Vowels'

n(A) = $^2C_2 = 1$

P(A) $= \frac{n(A)}{n(S)} = \frac{1}{6}$

53. In a game, cards are thoroughly shuffled and distributed equally among four players. What is the probability that a specific player gets all the four kings ? **June - 2016**

a) $\frac{^{13}C_4 \times ^{48}C_{13}}{^{53}C_{13}}$ b) $\frac{^4C_4 \times ^{48}C_9}{^{52}C_{13}}$ c) $\frac{^{13}C_4 \times ^{54}C_4}{^{52}C_{13}}$ d) $\frac{^4C_4 \times ^{39}C_9}{^{52}C_{13}}$

Answer:

(b) In a game, cards are thoroughly shuffled and distributed equally among four players.

Sample space n(s) = $^{52}C_{13}$

Event(A) = 'a specific player gets all four king'

n(A) = $^4C_4 \times ^{48}C_9$

Probability P(A) $= \frac{n(A)}{n(S)}$

$= \frac{C_4^4 \times C_9^{48}}{C_{13}^{52}}$

54. A bag contains 4 Red and 5 Black balls. Another bag contains 5 Red and 3 Black balls. If one ball is drawn at random from each bag. Then the probability that one Red and one Black drawn is -: **June - 2016**

a) $\frac{12}{72}$ b) $\frac{25}{72}$ c) $\frac{37}{72}$ d) $\frac{13}{72}$

Answer:

(c)

4 Red 5 Black = 9 Bag – I

5 Red 3 Black = 8 Bag – II

Require Probability = P(one Red from the Ist bag and one Black ball from the IInd bag) + P(one Red ball from the IInd bag and one Black ball from the Ist bag)

$= P(R_1 \cap B_2) + P(R_2 \cap B_1)$

$= P(R_1) \cdot P(B_2) + P(R_2) \cdot P(B_1)$

$= \frac{4}{9} \cdot \frac{3}{8} + \frac{5}{8} \cdot \frac{5}{9}$

$= \frac{12}{72} + \frac{25}{72}$

$= \frac{37}{72}$

55. If $P(A)=\frac{2}{3}, P(B)=\frac{3}{5}$ and $P(A\cup B)=\frac{5}{6}$ then $P\left(\frac{A}{B^1}\right)$ is **June - 2016**

a) $\frac{7}{12}$ b) $\frac{5}{12}$ c) $\frac{1}{4}$ d) $\frac{1}{2}$

56. If two unbiased dice are rolled, what is the probability of getting sum of points neither 3 or 6? **June - 2016**

a) 0.25 b) 0.50 c) 0.75 d) 0.80

Answer:

(d) If two dice are rolled then

Sample space n(s) = 36

Event 'A' = 'getting sum is either 3 or 6'

n(A) = 36 – 7

= 29

P(A) $= \frac{n(A)}{n(S)} = \frac{29}{36} = 0.80$

57. Two dice are tossed. What is the probability that the total is divisible by 3 or 4. **June - 2016**

a) $\frac{20}{36}$ b) $\frac{21}{36}$ c) $\frac{14}{36}$ d) None of these.

Answer:

(a) If two dice are rolled

Sample Space n(s) = 36

Event 'A' = 'The total sum is divisible by 3 or 4'

= {(1,2) (2,1) (5,1) (1,5) (3,3) (4,2) (2,4) (4,5) (5,4) (6,3) (3,6) (6,6) (1,3) (3,1) (2,2) (6,2) (2,6) (5,3) (3,5) (4,4)}

n(A) = 20

P(A) = $\frac{n(A)}{n(B)} = \frac{20}{36}$

58. If two events A, b $P(A) = \frac{1}{2}, P(B) = \frac{1}{3}$ *and* $(A \cup B) = \frac{2}{3}$ *then* $P(A \cap B)$ is : **Dec-2016**

a) 1/4 b) 1/6 c) 2/3 d) 1/2

Answer:

(b) P(A) = $\frac{1}{2}$, P(3) = $\frac{1}{3}$, P(A∩ B)= ?

P(A∪ B) = $\frac{2}{3}$

We know that

P(A∪ B) = P(A) + P(B) - P(A∩ B)

$\frac{2}{3} = \frac{1}{2} + \frac{1}{3}$ - P(A∩ B)

P(A∩ B) = $\frac{1}{2} + \frac{1}{3} - \frac{2}{3}$

P(A∩ B) = $\frac{3+2-4}{6}$

P(A∩ B) = $\frac{1}{6}$

59. A bag contains 6 white and 5 red balls. One ball is drawn. The probability that is drawn. The probability that it is red is : **Dec-2016**

a) 5/11 b) 6/11 c) 1/11 d) None of these

Answer:

(a) Total ball in the bag = 6W + 5R

= 11

If one ball is drawn from the bag then

sample space n(s) = $11C_1 = 11$

Event (A) = 'getting ball is Red'

= $5C_1$

n(A) = 5

P(A) = $\frac{n(A)}{n(S)} = \frac{5}{11}$

60. For two events, A, B let P(A) = $\frac{2}{3}$, P(B) = $\frac{3}{8}$ and $p(A \cap B) = \frac{1}{4}$ then A and B are : **Dec-2016**

a) Mutually exclusive but not independent b) Independent but not mutually exclusive

c) Mutually exclusive and independent d) None of these

Answer:

(b) Given P(A) = $\frac{2}{3}$, P(B) = $\frac{3}{8}$, P(A∩ B)= $\frac{1}{4}$

P(A) × P(B) = $\frac{2}{3} \times \frac{3}{8} = \frac{2}{8} = \frac{1}{4}$

P(A∩ B)= $\frac{1}{4}$

so, P(A∩ B) = P(A)· P(B)

so, A and B are Independent but not mutually exclusive.

61. Let A and B are two events P(A) = $\frac{2}{3}$, P (B) = $\frac{1}{4}$ and $P(A \cap B) = \frac{1}{12}$, then P(B/A) will be: **June-2017**

a) 7/8 b) 1/3 c) 1/8 d) 8/7

Answer:

(c) Given, P(A) = $\frac{2}{3}$, P(B) = $\frac{1}{4}$ and P(A∩ B)= $\frac{1}{12}$

$$P(B/A) = \frac{P(A \cap B)}{P(A)} = \frac{\frac{1}{12}}{\frac{2}{3}} = \frac{1}{12} \times \frac{3}{2} = \frac{1}{8}$$

62. For any two events A and B; **June-2017**

a) $P(A-B) = P(A) - P(B)$ b) $P(A-B) = P(A) - P(A \cap B)$

c) $P(A-B) = P(B) - P(A \cap B)$ d) $P(B-A) = P(B) + P(A \cap B)$

Answer:

(b) If A & B two events

P(A-B) = P(A∩ B)

= P(A) - P(A∩ B)

63. If for two mutually exclusive events A and B $P(A \cup B) = \frac{2}{5}$ and $P(A) = \frac{2}{5}$ then what is the value of P (B)? **Dec-2017**

(a) $\frac{4}{15}$ (b) $\frac{4}{9}$ (c) $\frac{5}{9}$ (d) $\frac{7}{15}$

Answer:

(a) Given $P(A \cup 3) = \frac{2}{3}$, $P(A) = \frac{2}{5}$

∵ A and B are two mutually exclusive events then P(A∩ B) = 0

P(A∪ B) = P(A) + P(B) - P(A∩ B)

$\frac{2}{3} = \frac{2}{5} + P(B) - 0$

$P(B) = \frac{2}{3} - \frac{2}{5} = \frac{10-6}{15} = \frac{4}{15}$

64. The probability distribution of the demand for a commodity is given below: **Dec-2017**

Demand (x)	5	6	7	8	9	10
Probability [P(x)]	0.05	0.10	0.30	0.40	0.10	0.05

The expected value of demand will be :

(a) 7.55 (b) 7.85 (c) 1.25 (d) 8.35

Answer:

(a)

Given	x_1	x_2	x_3	x_4	x_5	x_6
Demand(x)	5	6	7	8	9	10
Probability P(x)	0.05	0.10	0.30	0.40	0.10	0.05
	P_1	P_2	P_3	P_4	P_5	P_6

Expected Value

$E(x) = \sum P_1 x_1$

$= P_1x_1 + P_2 x_2 + P_3x_3 + P_4x_4 + P_5x\ 5 + P_6 x\ 6$

$= 0.05 \times 5 + 0{,}10 \times 6 + 0{,}30 \times 7 + 0.40 \times 8 + 0{,}10 \times 9 + 0.05 \times 10$

$= 0.25 + 0.60 + 2.10 + 3.20 + 0.90 + 0.50$

$= 7.55$

65. Given $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{1}{4}$, the value of P(A/B) is **Dec-2017**

a) 1/2 b) 1/6 c) 2/3 d) 3/4

Answer:

(d) Given

$P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{1}{4}$

$P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{1/4}{1/3} = \frac{1}{4} \times \frac{3}{1} = \frac{3}{4}$

66. If a brother and a sister are applied for 2 vacancies in the same post. The probability that brother will select is 1/7 and that of sister is 1/5, then the probability that (i) Both will select (ii) Only one will select, (iii) None of them will select : **Dec-2017**

(a) $\frac{1}{35}, \frac{10}{35}, \frac{24}{35}$ (b) $\frac{24}{35}, \frac{7}{35}, \frac{14}{35}$ (c) $\frac{3}{35}, \frac{24}{35}, \frac{11}{35}$ (d) $\frac{24}{35}, \frac{6}{35}, \frac{20}{35}$

Answer:

(a) Given

Probability of brother's selection $P(A) = \frac{1}{7}$

Probability of brother's 'not selection' P($\bar{A}$) = $\frac{6}{7}$

Probability of brother's selection P(B) = $\frac{1}{5}$

Probability of sister's not selection P(B) =1– $\frac{1}{5}$ = $\frac{4}{5}$

(i) Probability of both selected = P(A∩ B)
= P(A) , P(B)
= $\frac{1}{7} \times \frac{1}{5} = \frac{1}{35}$

(ii) P (only one is selected) = P(A∩ B) + P(B∩ A)
= P(A), P($\bar{B}$) + P(B), P($\bar{A}$)
= $\frac{1}{7} \times \frac{4}{5} + \frac{1}{5} \times \frac{6}{7}$

(iii) P(none of them is selected) = P($\bar{A} \cap B$)
= P($\bar{A}$) · P(B)
= $\frac{6}{7} \times \frac{4}{5} = \frac{24}{35}$

67. Two broad divisions of probability are: **May-2018**
(a) Subjective probability and objective probability
(b) Deductive probability and mathematical probability
(c) Statistical probability and mathematical probability
(d) None of these

68. The term "chance" and probability are synonyms: **May-2018**
(a) True (b) False (c). Both (d) None

69. The theorem of compound probability states that for any two events A and B **May-2018**
(a) P (A∩B) = P(A) × P(B/A) (b) P (A∪B) = P(A) × P(B/A)
(c) P (A∩B) = P(A) × P(B) (d) P (A∪B) = P(A) + P(B) P(A∩B)

Answer:

(a) The theorem of compound probability states that for only two events A and B given by

P(A∩ B) = P(A) × P(B/A)

70. Variance of a random variable x is given by **May-2018**
(a) $E(X-\mu)^2$ (b)E $[X - E(X)]^2$ (c) $E(X^2 - \mu)$ (d) (a) or (b)

Answer:

(d) Variance of a random variable x is given by

$V(x) = E(X-\mu)^2$

or

$V(x) = [E(X-E(x)]^2$

71. If two random variables x and y are related by y = 2 – 3x, then the SD of y is given by **May-2018**
(a) – 3 × SD of × (b) 3 × SD of × (c) 9 × SD of × (d) 2 × SD of ×

Answer:

(b) Given Equation

y = 2 – 3x

3x + y – 2 = 0

b = $\frac{-Coefficient\ of\ x}{Coefficient\ of\ y} = \frac{-3}{1} = -3$

S.D. of y = |b| S.D of X
= |-3| · S.D of x
= 3 × S.D of x

72. Sum of all probabilities mutually exclusive and exhaustive events is equal to **May-2018**
(a) 0 (b) 1/2 (c) 1/4 (d) 1

Answer:

(d) Sum of all probabilities mutually exclusive and exhaustive events is equal to 1.

73. If, $P(A) = \frac{1}{2}, P(B) = \frac{1}{3}$, and $P(A \cap B) = \frac{1}{4}$, then $P(A \cup B)$ is equal to **Nov-2018**

(a) $\frac{11}{12}$ (b) $\frac{10}{12}$ (c) $\frac{7}{12}$ (d) $\frac{1}{6}$

Answer:

(c) Given:

$P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$, $P(A \cap B) = \frac{1}{4}$

We know that

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= \frac{1}{2} + \frac{1}{3} - \frac{1}{4}$

$= \frac{6+4-3}{12}$

$= \frac{7}{12}$

74. Ram is known to hit a target in 2 out of 3 shots where as Shyam is knows to hit the same target in 5 out of 11 shots. What is the probability that the target would be hit if they both try? **Nov-2018**

(a) $\frac{9}{11}$ (b) $\frac{3}{11}$ (c) $\frac{10}{33}$ (d) $\frac{6}{11}$

Answer:

(a) Let A be the event that Ram hits the target.

Let B be the event that Shyam hits the target.

Then, $P(A) = \frac{2}{3}$; and $P(B) = \frac{5}{11}$

Since both are independent events, $P(A \cap B) = P(A) \times P(B)$

Therefore, $P(A \cap B) = \frac{2}{3} \times \frac{5}{11} = \frac{10}{33}$

Now, the probability that the target would be hit by at least one of them is given by $P(A \cup B)$.

We know that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

Therefore, $P(A \cup B) = \{\frac{2}{3} + \frac{5}{11}\} - \frac{10}{33} = 0.8181$

Now, try the options:

Option (a) $\frac{9}{11}$

On calculator, we find that $\frac{9}{11} = 0.8181$. Therefore, option(a) is the answer.

75. Two different dice are thrown simultaneously, that the sum of two numbers appearing on the top of dice is 9 is **Nov-2018**

(a) $\frac{8}{9}$ (b) $\frac{1}{9}$ (c) $\frac{7}{9}$ (d) None of the above

Answer:

(b) If two dice are Rolled then

Sample space $n(s) = 6^2 = 36$

Event (A) = Getting the sum is '9'

= {(6,3) (3,6) (4,5) (5,4)}

n(A) = 4

$P(A) = \frac{n(A)}{n(S)} = \frac{4}{36} = \frac{1}{9}$

76. $P(A \cup B) = 0.8$ and $P(A \cap B) = 0.3, then\ P(\bar{A}) + P(\bar{B})$ is equal to **Nov-2018**

(a) 0.3 (b) 0.5 (c) 0.7 (d) 0.9

Answer:

(d) Given:

$P(A \cup B) = 0.8$ and $P(A \cap B) = 0.3$

We know that

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$0.8 = [1 - P(\bar{A})] + [1 - P(\bar{B})] - 0.3$

$0.8 = 1 - P(\bar{A}) + 1 - P(\bar{B}) - 0.3$

$P(\bar{A}) + P(\bar{B}) = 2 - 0.3 - 0.8$

$P(\bar{A}) + P(\bar{B}) = 0.9$

77. If $Y \geq x$ then mathematical expectation is **June-2019**

(a) E (X) > E (Y) (b) E (X) ≤ E (Y) (c) E (X) = E (Y) (d) E (X) . E (Y) = 1

Answer:

(b) If y ≥ x

then E(y) ≥ E(x)

E(x) ≤ E(y)

78. Two event A and B are such that they do not occurs simultaneously then they are called _____ events **June-2019.**

(a) Mutually exhaustive (b) Mutually exclusive

(c) Mutually independent (d) Equally likely

79. According to bayee's theorem, **June-2019.**

$$P(E_K/A) = \frac{P(E_K)\,P(A/E_K)}{\sum_1^n P(E_1)\,P(A/E_1)}$$

(a) E_1, E_2 …….. are mutually exclusive

(b) $P(E/A_1), P(E/A_2)$ ……. are equal to 1

(c) $P(A_1/E), P(A_2/E)$ ……. are equal to 1

(d) A & E_1's are disjoint sets.

Answer:

(a) According to Bayee' Theorem

$P(E_k/A) = \frac{P(E_k)P(A/E_k)}{\sum_{i=1}^{h} P(E_i)\cdot P(A/E_i)}$

Here, E_1, E_2, E_3 …. are Mutually Exclusive.

80. If a coin is tossed 5 times then the probability of getting Tail and Head occurs alternatively is **June-2019**

(a) $\frac{1}{8}$ (b) $\frac{1}{16}$ (c) $\frac{1}{32}$ (d) $\frac{1}{64}$

Answer:

(b) P(getting tail and Head occurs Alternative)

= P(HTHTH) or P(THTHT)

$= \left(\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\right) + \left(\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\right)$

$= \frac{1}{32} + \frac{1}{32}$

$= \left(\frac{1+1}{32}\right)$

$= \frac{2}{32}$

$= \frac{1}{16}$

81. When 2 – dice are thrown Simultaneously then the probability of getting at least one 5 is **June-2019**

(a) $\frac{11}{36}$ (b) $\frac{5}{36}$ (c) $\frac{8}{15}$ (d) $\frac{1}{7}$

Answer:

(a) If two dice are thrown then sample space n(s) = 36

Events 'A' = getting at least one '5'

'A' = $\begin{bmatrix}(5,1)(5,2)(5,3)(5,4)(5,5)(5,6)\\(1,5)(2,5)(3,5)(4,5)(6,5)\end{bmatrix}$

n(A) = 11

p(A) = $\frac{n(A)}{n(S)}$

= $\frac{11}{36}$

In Binomial Distribution.

82. Two letters are choosen from the word HOME. What is the probability that the letters choosen are not vowels. **Nov-2019**

(a) ½ (b) 1/6 (c) 2/3 (d) 0

Answer:

(b) HOME

Total letters = 4

Total vowels = 2 {O, E}
Total Consonants = 2 {H,M}
P(that 2 letters choosen are not vowels)
P(that 2 letters choosen are consonants)
$= \frac{C_2^2}{C_2^4} = \frac{1}{6}$ (Required probability)

83. If A, B, C are three mutually exclusive and exhaustive events such that : P(A) = 2(B) = 3P(C) what is P(B)? **Nov-2019**
(a) 6/11 (b) 3/11 (c) 1/6 (d) 1/3

Answer:

(b) Since A, B, C are mutually exclusive events
$P(A \cap B) = 0, P(B \cap C) = 0, P(C \cap A) = 0$ and $P(A \cap B \cap C) = 0$
Since A,B, C are mutually exhaustive $P(A \cup B) = 1$
$P(A \cup B) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(C \cap A) + P(A \cap B \cap C)$
$1 = P(A) + P(B) + P(C) - 0 - 0 - 0 + 0$
$P(A) + P(B) + P(C) = 1$ Eq - 1
In given question ; P(A) = 2P(B) = 3P(C)
P(A) = 2P(B) Eq – 2
and $P(C) = \frac{2}{3} P(B)$ Eq - 3
Put Eq 2 and 3 in Eq 1
$2P(B) + P(B) + \frac{2}{3} P(B) = 1$
$\frac{11}{3} P(B) = 1$
$P(B) = \frac{3}{11}$

84. What is the probability of getting 7 or 11 when two dices are thrown? **Nov-2019**
(a) 2/9 (b) 6/36 (c) 10/36 (d) 2/36

Answer:

(a) When two dices are thrown
n(S) = 36
A Event of getting sum 7
B Event of getting sum 11
A {(1,6), (2,5), (3,4), (4,3), (5,2), (6,1)}
n(A) = 6
B {(5,6), (6,5)}
n(B) = 2
P (of getting sum 7 or 11) $= \frac{6+2}{36}$
$= \frac{8}{36} = \frac{2}{9}$

85. A log contains 15 one rupee Coins, 25 two rupee coins and 10 five rupee coins if a coin is selected at random than probability for not selecting a one rupee coin is: **Nov-2019**
(a) 0.30 (b) 0.20 (c) 0.25 (d) 0.70

86. What is the probability of occurring 4 or more than 4 accidents. **Nov-2019**

No. of acc.	1	2	3	4	5	6	7
Frequency	8	17	15	24	27	18	9

(a) 24 /118 (b) 69/118 (c) 78/118 (d) 80/118

87. When 2 fair dice are thrown what is the probability of getting the sum which is a multiple of 3? **Nov – 2020**
(a) 4/36 (b) 13/36 (c) 2/36 (d) 12/36

88. When two coins are tossed simultaneously the probability of getting at least one tail? **Nov–2020 Ans: (b)**
(a) 1 (b) 0.75 (c) 0.5 (d) 0.25

Answer:

(b) If two coins are tossed
Then Sample Space S = {HH, HT, TH, TT}

n(S) = 4

Event (A) = 'getting at least one tails'

(A) = {HT, TH, TT}

n(A) = 3

P(A) = $\frac{n(A)}{n(S)} = \frac{3}{4} = 0.75$

89. When 3 dice are rolled simultaneously the probability of a number on the third die is greater than the sum of the numbers on two dice. **Nov – 2020**

(a) 12/216 (b) 36/216 (c) 48/216 (d) 20/216

Answer:

(d) If three dice are rolled then

Sample Space n(s) = 6^3 = 216

Event 'A' = 'getting Nos. on the third die is greater than the sum of the No. of two dice'

= {(1,1,3) (1,1,4) (1,1,5) (1,1,6) (1,2,4) (1,2,5) (1,2,6) (1,3,5) (1,3,6) (1,4,6) (2,1,4) (2,1,5) (2,1,6) (2,2,5) (2,2,6) (2,3,6) (3,1,5) (3,1,6) (3,2,6) (4,1,6)}

n(A) = 20

P(A) = $\frac{n(A)}{n(S)} = \frac{20}{216}$

90. If a speaks 75% of truth and B speaks 80% of truth. In what percentage both of them likely contradict with each other in narrating the same questions? **Non – 2020**

(a) 0.60 (b) 0.45 (c) 0.65 (d) 0.35

Answer:

(b) P(A) = $\frac{75}{100}$, P(B) = $\frac{60}{100}$

P($\bar{A}$) = 1 – P(A) P(B) = 1– P(B)

= $\frac{1-75}{100}$ = $\frac{1-60}{100}$

= $\frac{25}{100}$ = $\frac{40}{100}$

P (Both of them are contradict)

⇨ P(A∩B) or P(B∩A)

= P(A). P(B) + P(B). P(A)

= $\frac{75}{100} \times \frac{40}{100} + \frac{60}{100} \times \frac{25}{100}$

= 0.30 + 0.75

= 0.45

91. An event that can be subdivided into further events is called as. **Jan – 2021**

(a) A composite event (b) A complex event (c) A mixed event (d) A simple event

92. Three identical and balanced dice are rolled. The probability that the same number will appear on each of them is. **Jan – 2021**

(a) $\frac{1}{6}$ (b) $\frac{1}{18}$ (c) $\frac{1}{36}$ (d) $\frac{1}{24}$

Answer:

(c) If three identical dice are rolled then no. of sample space

n(s) = 6^3

= 216

Event (A) = 'getting some Number will appear in each'

= {(1,1,1), (2,2,2), (3,3,3), (4.4.4), (5,5,5), (6,6,6)}

n (A) = 6

P(A) = $\frac{n(A)}{n(s)} = \frac{6}{216} = \frac{1}{36}$

93. A basket contains 15 white balls, 25 red balls and 10 blue balls. If a ball is selected at random, the probability of selecting not a white ball. **Jan – 2021**

(a) 0.20 (b) 0.25 (c) 0.60 (d) 0.70

Answer:

(d) Total Balls = 15W + 25R + 10B
= 50
If one ball is selected then
Sample Space n(s) = $^{50}C_1 = 50$
Event (A)= ' getting not a white ball'
n(A) = $^{3n5}C_1 = 35$
P(A) = $\frac{n(A)}{n(s)} = \frac{35}{50} = 0.70$

94. Two dice are thrown simultaneously. The probability of a total score of 5 from the out comes of dice is **Jan – 2021**

(a) $\frac{1}{18}$ (b) $\frac{1}{12}$ (c) $\frac{1}{9}$ (d) $\frac{1}{5}$

Answer:

(c) Two dice are thrown simultaneously.
Then sample space n(s) = 36
Event (A) = getting score of '5'
= {(2,3)(3,2)(4,1)(1,4)}
n(A) = 4
p(A) = $\frac{4}{36} = \frac{1}{9}$

95. If an unbiased coin is tossed twice, then the probability of obtaining at least one tail is. **Jan – 2021**

(a) 1 (b) 0.5 (c) 0.75 (d) 0.25

Answer:

(c) If an unbiased coin is lossed twice
then sample space (s) = {HH, HT, TH, TT}
n (s) = 4
Event (A) = 'getting at least one tall'
= (HT, TH, TT)
n(A) = 3
P(A) = $\frac{n(A)}{n(S)} = \frac{3}{4} = 0.75$

96. If an unbiased coin is tossed three times , What is the probability of getting more than one head? **Jan – 2021**

(a) $\frac{1}{2}$ (b) $\frac{3}{8}$ (c) $\frac{7}{8}$ (d) $\frac{1}{3}$

Answer:

(a) If an unbiased coin is tossed three times

then sample space (s) = {HHH, HHT, HTH, HTT, TTT, TTH, THT,THH}

n(s) = 8

Event (A) = getting more than one head
= (HTH,HHT,THH,HHH)
n(a) = 4
P(A) = $\frac{4}{8} = \frac{1}{2}$

97. If there are 48 marbles marked with numbers 1 to 48, then the probability of selecting a marble having the number divisible by 4 is: **July – 2021**

(a) 1/2 (b) 2/3 (c) 1/3 (d) 1/4

Answer:

(d) Total marble = 48 (from 1 to 48)
If one Number is selected then
sample space n(S) = 48
Event (A) = " gettingNo is divisible by '4'"
= {4,8,12,16,20,24,28,32,36,40,44,48}
n(A) = 12
P(A) = $\frac{n(A)}{nc57} = \frac{12}{48} = ¼$

98. A bag contains 7 blue and 5 Green balls. One ball is drawn at random. The probability of getting a blue ball is _____. **July – 2021**

(a) 5/12 (b) 12/35 (c) 7/12 (d) 0

Answer:

(c) Total balls in the bag = 7 Blue + 5 green
= 12

If one ball in selected then

Sample space n(S) = $^{12}C_1 = 12$

Event (A} = 'Getting blue balls'

n(A) = $^{7}C_1 = 7$

P(A) = $\frac{n(A)}{n(S)} = \frac{7}{12}$

99. The probability that a football team loosing a match at Kolkata is 3/5 and winning a match at Bengaluru is 6/7 ; the probability of the team winning at least one match is _____. **July – 2021**

(a) 3/35 (b) 18/35 (c) 32/35 (d) 17/35

Answer:

(c) Here

A→ winning the match in Kolkata

B→ winning the match in Bangaluru

Given

P $(\bar{A}) = \frac{3}{5}$, P(B) = $\frac{6}{7}$

P(B) = $1 - \frac{6}{7} = 1/7$

P(Both matches are lossing) = P$(\bar{A} \cap \overline{B})$

= P$(\bar{A})$, P$(\bar{B})$

= $\frac{3}{5} \times \frac{1}{7}$

= $\frac{3}{36}$

P(at least one match winning)

= 1 – P(Both matches are lossing)

= $1 - \frac{3}{35}$

= $\frac{32}{35}$

100. If in a class, 60% of the student study. Mathematics and science and 90% of the student study science, then the probability of a student studying mathematics given that he/she is already studying science is: **July – 2021**

(a) 1/4 (b) 2/3 (c) 1 (d) 1/2

Answer:

(b) Mathematics → A

Science → B

Here P$(A \cap B) = \frac{60}{100} = 0.6$

P(B) = $\frac{90}{100} = 0.9$

P(A/B) = P$\frac{(A \cap B)}{P(B)} = \frac{0.6}{0.9} = \frac{2}{3}$

101. A biased coin is such that the probability of getting a head is thrice the probability of getting a tail, if the coin is tossed 4 times, what is the probability of getting a head all the times ? **July– 2021**

(a) 2/5 (b) 81/128 (c) 81/256 (d) 81/64

Answer:

(c) Here Probability of success = p

Probability of failure = q

Given, p = 3q _____(1)

we know that

p + q = 1

3q + q = 1

4q = 1

q = 1/4

q = ¼ in eq. (1) weget

$p = 3 \times \frac{1}{4}$

$p = ¾$

Here $n = 4$

$p(\text{all Head}) = p(x = 4)$

$= {}^{n}C_x \cdot p^x \cdot q^{n-x}$

$= {}^{4}C_4 \cdot \left(\frac{3}{4}\right)^4 \left(\frac{1}{4}\right)^{4-4}$

$= 1 \times \frac{81}{256} \times 1 = \frac{81}{256}$

102. If there are 16 phones, 10 of them are Android and 6 of them are of Apple, then the probability of 4 randomly selected phones to include 2 Android and 2 Apple phone is: **July – 2021**

(a) 0.47 (b) 0.51 (c) 0.37 (d) 0.27

Answer:

(c) Total phone = 16

No. of android phone = 10 No. of Apples phone = 6

If 4 phone are selected at random then sample splace $n(S) = {}^{16}C_4$

Events (A) = getting 2 Android and 2 Apples Phones

$n(A) = {}^{10}C_2 \times {}^{6}C_2$

Req. Probability $= \frac{C_2^{10} \times C_2^6}{C_4^{16}}$

$= 0.37$

103. The value of K for the probability density function of a variate X is equal to: **July–2021**

X	0	1	2	3	4	5	6
P(x)	5k	3k	4k	6k	7k	9k	11k

(a) 39 (b) $\frac{1}{40}$ (c) $\frac{1}{49}$ (d) $\frac{1}{45}$

Answer:

(d) Given

x : 0 1 2 3 4 5 6

P(x) : 5k 3k 4k 6k 7k 9k 11k

In prob. distribution

$\sum Pi = 1$

$5k + 3k + 4k + 6k + 7k + 9k + 11k = 1$

$45k = 1$

$K = 1/45$

104. For any two dependent events A and B, P(A) = 5/9 and P(B) = 6/11 and P(A ∩ B) = 10/33. What are the values of P (A/B) and P (B/A) ? **Dec 2021**

(a) 5/9, 6/11 (b) 5/6, 6/11 (c) 1/9, 2/9 (d) 2/9, 4/9

Answer:

(a) $P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{10/33}{6/11} = \frac{10}{33} \times \frac{11}{6} = \frac{10}{18} = \frac{5}{9}$

$P(B/A) = \frac{P(B \cap A)}{P(A)} = \frac{10/33}{5/9} = \frac{10}{33} \times \frac{9}{5} = \frac{18}{33} = \frac{6}{11}$

105. Which of the following pair of events E and F are Mutually exclusive? **Dec 2021**

(a) E = {Ram's age is 13} and F = {Ram is studying in a college}

(b) E = {Sita studies in a school} and F = {Sita is a play back singer}

(c) E = {Raju is an elder brother in a family} and F = {Raju's father has more than one sone}

(d) E = {Banu studies B.A. English literature and} F = {Banu can read English Novels}

106. Assume that the probability for rain on day is 0.4 An umbrella Salesman can earn ₹ 400 per day in case of rain on that day and will lose ₹ 100 per day if there is no rain. The expected earnings in (in₹) per day of the salesman is **Dec 2021**

(a) 400 (b) 200 (c) 100 (d) 0

Answer:

(c)

x	P	px
400	0.4	160
-100	0.6	-60
		px = 100

107. The probability distribution of a random variable x is given below: **Dec 2021**

X:	1	2	4	5	6
P:	0.15	0.25	0.2	0.3	6.1

What is the Standard deviation of x?

(a) 1.49 (b) 1.56 (c) 1.69 (d) 1.72

108. In a group of 20 males and 15 females, 12 males and 8 females are service holders. What is the probability that a person selected at random from the group is a service holder given that the selected person is male? **Dec 2021**

(a) 0.40 (b) 0.60 (c) 0.45 (d) 0.55

Answer:

(b) Since the selected person is a male, the total number of outcomes = 20 .

Number of Favourable Outcomes = 12

Probability = $\frac{Number\ of\ Favourable\ Outcomes}{Total\ Number\ of\ Outcomes}$

Probability = 12/20 = 0.60

109. There are 3 boxes with the following composition : **Dec 2021**

Box I : 7 Red + 5 White + 4 Blue balls

Box II : 5 RED + 6 White + 3 Blue balls

Box III : 4 Red + 3 White + 2 Blue balls

One of the boxes is selected at random and a ball is drawn from It.

What is the probability the drawn ball is red ?₹

(a) 1249 / 3024 (b) 1247 / 3004 (c) 1147 / 3024 (d) 1 / 2

Answer:

(a) Case 1 – Box I is drawn.

Probability of drawing Box I = 1/3 and

Probability of drawing a red ball from it = 7/16

Case 2 – Box II is drawn.

Probability of drawing Box II = 1/3 and

Probability of drawing a red ball from it = 5/14

Case 3 – Box III is drawn.

Probability of drawing Box III = 1/3 and

Probability of drawing a red ball from it = 4/9

Therefore,

Probability = $\left(\frac{1}{3}\times\frac{7}{16}\right)+\left(\frac{1}{3}\times\frac{5}{14}\right)+\left(\frac{1}{3}\times\frac{4}{9}\right)$ = 0.4130

Now, try the options.

Option (a) ⟶ 1249/3024

1249 ÷ 3024 = 0.4130

Therefore, option (a) is the answer.

110. For a probability distribution, probability is given by, P(Xi) = $\frac{X}{k}$, X_p = 1,2,……9. The value of k is **Dec 2021**

(a) 55 (b) 9 (c) 45 (d) 81

Answer:

(c) Note: P(X_i) = $\frac{X_i}{k}$ should be ideally written as P(X_i) = $\frac{X_i}{k}$

We know that sum of Probabilities is 1.

$\frac{1}{k}+\frac{2}{k}+\frac{3}{k}+\frac{4}{k}+\frac{5}{k}+\frac{6}{k}+\frac{7}{k}+\frac{8}{k}+\frac{9}{k}=1$

$$\frac{1+2+3+4+5+6+7+8+9}{k} = 1$$

We know that sum of first n natural numbers is given by $\frac{n(n+1)}{2}$

Therefore, $\frac{9(9+1)}{2} \div k = 1$

$$\frac{90}{2} \times \frac{1}{k} = 1$$

$$\frac{45}{k} = 1$$

$$k = 45$$

111. A dice is rolled twice. Find the probability of getting numbers multiple of 3 or 5? **June 2022**

(a) $\frac{1}{3}$ (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) $\frac{1}{6}$

Answer:

(c) If one dice is rolled twice then

No. of sample space n(s) = 36

Events (A) = " getting No is multiple of '3' or'5' "

(A)= { (2,1), (5,1), (1,5), (4,2) (2,4) (3,3) (6,3) (3,6) (5,4) (4,5) (6,6) (4,1) (1,4) (2,3) (3,2) (6,4) (4,6) (5,5)}

n(A) = 18

$P(A) = \frac{n(A)}{n(S)} = \frac{18}{36} = \frac{1}{2}$

112. What is the probability of occurrence of leap year having 53 Sunday? **June 2022**

(a) $\frac{1}{7}$ (b) $\frac{2}{7}$ (c) $\frac{3}{7}$ (d) $\frac{4}{7}$

Answer:

(b) There are 366 days in a year.

$$7\overline{)366}\ 52,\ 35,\ 16,\ 14,\ 2 \rightarrow$$

odd days

2days may be

(i) Sunday & Monday
(ii) Monday & Tuesday
(iii) Tuesday & Wednesday
(iv) Wednesday & Thursday
(v) Thursday & Friday
(vi) Friday & Saturday
(vii) Saturday & Sunday

Here n(S) = 7

n(A) = 2

$P(A) = \frac{n(A)}{n(S)} = \frac{2}{7}$

113. If in a bag of 30 balls numbered from 1 to 30. Two balls are drawn find probability of getting a ball being multiple of 2 or 5 **June 2022**

(a) $\frac{108}{465}$ (b) $\frac{117}{435}$ (c) $\frac{117}{300}$ (d) $\frac{116}{485}$

Answer:

(b) In a bag of 30 ball's numbered From '1 to 30'. If two balls are drawn from the ball then sample space n(s) = $^{30}C_2$

$= \frac{30\times29}{2\times1} = 435$

A getting ball No as multiple of 2

$n(A) = {}^{15}C_2 = \frac{15\times14}{2\times1} = 105$

$P(A) = \frac{105}{435}$

B → getting ball No as multiple of 5

$n(B) \rightarrow {}^{6}C_2 = \frac{6\times5}{2\times1} = 15$

$P(B) = \frac{15}{435}$

A∩ B getting ball is No is multiple of 2 and 5(10)

$n(A\cap B) = {}^{3}C_2 = 3$

$P(A\cap B) = \frac{3}{435}$

P('2' or '5') = P(A∪ B)

$= P(A) + P(B) - P(A\cap B)$

$= \frac{105}{435} + \frac{15}{435} - \frac{3}{435}$

$= \frac{105+15-3}{435}$

$= \left(\frac{117}{435}\right)$

114. Two perfect dice are rolled what is the probability that one appears at least in one of the dice? **June 2022**

(a) $\frac{7}{36}$ (b) $\frac{11}{36}$ (c) $\frac{9}{36}$ (d) $\frac{15}{36}$

Answer:

(b) If two dice are Rolled then

Sample space n(s) = 36

Event 'A' "getting '1' appears at least in one of the dice"

{ (1,2) (1,3) (1,4) (1,5) (1,6) (1,1) (2,1) (3,1) (4,1) (5,1) (6,1)}

n(A) = 11

$P(A) = \frac{n(A)}{n(S)} = \frac{11}{36}$

115. If two dice are rolled and one of the dice shows 1 at a point then how many such outcome can be done where it is known that its probability is $\frac{x}{36}$, where x = _____ **June 2022**

(a) 11 (b) 7 (c) 8 (d) 9

Answer:

(a) If two dice are Rollet then sample space n(s) = 36

Event (A) = "getting one of the dice show as 1"

{(1,1) (1,2) (1,3) (1,4) (1,5) (1,6)}

(2,1) (3,1) (4,1) (5,1) (6,1)

n(A) = 11

116. If P (A) = 0.3; P (B) = 0.8 and $P\left(\frac{B}{A}\right) = 0.5$, find P (A ∪ B) **June 2022**

(a) 0.85 (b) 0.95 (c) 0.55 (d) 0.5

Answer:

(b) Given P(A) = 0.3 , P(B) = 0.8 , P(B/A) = 0.5

$P(B/A) = \frac{P(A\cap B)}{P(A)}$

$0.5 = \frac{P(A\cap B)}{0.3}$

$P(A\cap B) = 0.5\times0.3 = 0.15$

$P(A\cup B) = P(A) + P(B) - P(A\cap B)$

$= 0.3 + 0.8 - 0.15$

$= 1.10 - 0.15 = 0.95$

117. If P Q are the odds in favour of an event, then the probability of that event is – **June 2022**

(a) $\frac{p}{q}$ (b) $\frac{p}{p+q}$ (c) $\frac{q}{p+q}$ (d) $\frac{q}{p}$

Answer:

(b) If odd in favour of an event = p : q

Then Probability of success P(A) = $\frac{p}{(p+q)}$

118. A machine is made of two parts A and B. The manufacturing process of each part is such that probability of defective in part A is 0.08 and that B is 0.05. What is the probability that the assembled part will not have any defect? **Dec 2022**

(a) 0.934 (b) 0.864 (c) 0.85 (d) 0.874

Answer:

(d) P(defective part of A) = 0.08

$P(\overline{A}) = 0.08$

P(defective part of B) = 0.05

$P(\overline{B}) = 0.05$

$P(A) = 1 - P(\overline{A}) = 1 - 0.08 = 0.92$

$P(B) = 1 - P(\overline{B}) = 1 - 0.05 = 0.95$

P(the Assembled part will not have any defect)

$= P(A \cap B)$

$= P(A) \cdot P(B)$

$= 0.92 \times 0.95$

$= 0.874$

119. If $P(A) = \frac{1}{3}$, $P(B) = \frac{3}{4}$ and $P(A \cup B) = \frac{11}{12}$ then $P\left(\frac{B}{A}\right)$ is: **Dec 2022**

(a) $\frac{1}{6}$ (b) $\frac{4}{9}$ (c) $\frac{1}{2}$ (d) $\frac{1}{8}$

Answer:

(c) We know that:

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\frac{11}{12} = \frac{1}{3} + \frac{3}{4} - P(A \cap B)$

$P(A \cap B) = \frac{1}{3} + \frac{3}{4} - \frac{11}{12}$

$= \frac{4+9}{12} = 11$

$= \frac{\cancel{2}}{\cancel{12}} \frac{1}{6}$

$P(A \cap B) = \frac{1}{3}$

$P(B/A) = \frac{P(A \cap B)}{P(A)}$

$= \frac{\frac{1}{6}}{\frac{1}{3}}$

$= \frac{1}{6} \times \frac{3}{1}$

$= \frac{1}{2}$

120. The probability that a leap year has 53 Monday is: **Dec 2022**

(a) $\frac{1}{7}$ (b) $\frac{2}{3}$ (c) $\frac{2}{7}$ (d) $\frac{3}{5}$

Answer:

(c) There are 366 days in a leap year.

$7\overline{)366}\ 52$

35

16

14

2 → Odd days

(a) Sunday & Monday
(b) Monday & Tuesday
(c) Tuesday & Wednesday
(d) Wednesday & Thursday
(e) Thursday & Friday
(f) Friday & Saturday
(g) Saturday & Sunday

n(S) = 7
n(A) = 2
P(A) = 2/7

121. Suppose A and B are two independent events with probabilities P(A) ≠ 0 and P(B) ≠ 0. Let A' and B' be their complements. Which one of the following statements in FALSE? **Dec 2022**

(a) P(A ∩ B) = P(A) P(B) (b) P(A / B) = P(A)
(c) P(A ∪ B) = P(A) + P(B) (d) P(A' ∩ B') = P(A')

Answer:

(c) If A and B are two independent events.
Where P(A) ≠ 0 and P(B) ≠ 0 and Let 'A' and 'B' be their complements. Then,
P(A∪ B) = P(A) + P(B) is false and rest of all is true.

122. The Theorem of compound Probability states that for any two events A and B. **Dec 2022**

(a) P(A ∩ B) = P(A) × P(B / A) (b) P(A ∪ B) = P(A) × P(B / A)
(c) P(A ∩ B) = P(A) × P(B) (d) P(A ∪ B) = P(A) + P(B) – P(A ∩ B)

Answer:

(a) The theorem of compound probability states that for any two events A and B is
$P(A \cap B)$ =
P(A)×P(B/A)

123. If a number is selected at random from the first 50 natural numbers, what will be the probability that the selected number is a multiple of 3 and 4? **Dec 2022**

(a) 5/50 (b) 2/25 (c) 3/30 (d) 4/25

Answer:

(b) There are first 50 natural numbers
If one number is selected. Then
No. of sample space n(s) = 50
Event (A) = getting no. is multiple of
2 and 4 (i.e. = 12)

$n(A) = \frac{50}{12}$

n(A) = 4

$P(A) = \frac{n(A)}{n(S)} = \frac{4}{50} = \frac{2}{25}$

124. If three coins are tossed simultaneously, what is the probability of getting two heads together? **Dec 2022**

(a) 1/4 (b) 1/8 (c) 5/8 (d) 3/8

Answer:

(d) If three coins are tossed simultaneously
Then sample space (s) = {HHH, HHT, HTH, HTT, TTT, TTH, THT, THH}
n(s) = 8

Event (A) = 'getting exactly two head'
= { HHT, HTH, THH}
n(A) = 3
Then P(A) = $\frac{n(A)}{n(S)} = \frac{3}{8}$

125. Four persons are chose at random frame a group of 3 men , 2women and 4 children . The probability that exactly 2 of them are children is ? June 2023
(a) 10/21 (b) 1/12 (c) 1/5 (d) 1/9
Answer:
(a) Total person = 3M + 2W + 4C
= 9
If four persons are taken at a time
Then no. of samples pace n(s) = $^9C_4$
$= \frac{9\times8\times7\times6}{4\times3\times2\times1}$
= 126
Events (A) = Exactly 2 of them are children
= $^4C_2 \times {}^5C_2$
= 6 × 10
n(A) = 60
P(A) = $\frac{n(A)}{n(S)} = \frac{60}{126} = \frac{10}{21}$

126. If P (A)=1/3, P (B) = $^1/_4$ P (A/B) =1/6 , the probability P (B/A) is June 2023
(a) 1/8 (b) 1/4 (c) 3/8 (d) 1/2
Answer:
(a) P(A) = $\frac{1}{3}$, P(B) = $\frac{1}{4}$, P(A/B) = $\frac{1}{6}$ find P(A/B)
We know that
$P(A/B) = \frac{P(A \cap B)}{P(B)}$
$P(A \cap B) = P(B) \times P(A/B)$
$= \frac{1}{4} \times \frac{1}{6}$
$= \frac{1}{24}$
$P(B/A) = \frac{P(A \cap B)}{P(A)} = \frac{1/24}{1/3} = \frac{3}{24} = \frac{1}{8}$

127. Company a produces 10% defective products, company B produces 20% defective products , company C produces 5% defective products. If choosing company is an equally likely events . What is probability that the product . Chosen is free from defect . June 2023
(a) 0.88 (b) 0.80 (c) 0.79 (d) 0.78
Answer:
(a) There are 3 company 'A' , 'B' and 'C'

Company A	Company B	Company C

P(A) = P(B) = P(C) = 1/3
P(E/A) = $\frac{10}{100}$, P(E/B) = $\frac{20}{100}$, P(E/C) = $\frac{5}{100}$
Probability that product chosen is defective
= P(A) . P(E/A) + P(B) . P(E/B) + P(C) . P(E/C)
$= \frac{1}{3} \times \frac{10}{100} + \frac{1}{3} \times \frac{20}{100} + \frac{1}{3} \times \frac{5}{100}$
$= \frac{1}{3}\left[\frac{10}{100} + \frac{20}{100} + \frac{5}{100}\right] = \frac{1}{3} \times \frac{35}{100} = 0.12$
Then probability that product chosen is free of defect
= 1 – 0.12 = 0.88

128. The probability distribution of x given below

Value of x	1	0	Total
Probability	P	1-P	1

Mean is equal to . June 2023

(a) P (b) 1-P (c) 0 (d) 1

Answer:

(a) Here,

x_i	1	0	Total
P_i	P	(1 - P)	1

Mean = E(x)

$= \sum P_i x_i$

$= P_1X_1 + P_2X_2$

$= P \times 1 + (1 - P) \times 0$

$= P + 0$

$= P$

129. For any two events A and B. It is P (A) = 2/3, P (B) =3/8 and P (A B) = ¼ . Then the events A and B are June 2023

(a) Mutually exclusive and independent

(b) Mutually not exclusive and independent

(c) Mutually exclusive , But not independent

(d) Neither independent nor mutually exclusive

Answer:

(b) Given:

$P(A) = \frac{2}{3}$, $P(B) = \frac{3}{8}$ and $P(A \cap B) = \frac{1}{4}$

Now

$P(A \cap B) = P(A) \times P(B)$

$= \frac{2}{\cancel{3}} \times \frac{\cancel{3}}{8}$

$\boxed{P(A \cap B) = \frac{1}{4}}$

$P(A \cap B) = P(A) \times P(B)$

So A & B are Independent event but not mutually exclusive

130. The Probability that a 4-digit number comprising the digit 2,5,6 and 7 without refection of digit would be divisible by 4. June 2023

(a) 1/2 (b) 3/4 (c) 1/4 (d) 1/3

Answer:

(d) Total 4 digit Numbers are made from using the digit 2, 5, 6, 7 are

2567	5267	6257	7256
2576	5276	6275	7265
2657	5627	6527	7526
2675	5672	6572	7562
2756	5726	6725	7625
2765	5762	6752	7652

Here, Total sample space n(s) = 24

(A) = Numbers 'which is divisible by '4'

= {2576, 2756, 5276, 5672, 6572, 6752, 7256, 7652}

n(A) = 8

$P(A) = \frac{n(A)}{n(S)} = \frac{8}{24} = \frac{1}{3}$

131. On a commodity exchange when booking traits with provision for stop strider can make a profit of ₹50,000 or incur a loss of ₹20,000. The probability of making profit an incurring losses from the part experience are known to be_____ and 0.5 respectively . The

expected profit to be made by trader should be . June 2023

(a) ₹32,500 (b) ₹35,000 (c) ₹30,000 (d) ₹35,200

Answer:

(a) Profit (+) and Loss(-)

x_i =	50,000	-20,000
p_i =	0.85	0.5

Expected Profit E(x) = $\sum p_i x_i$

= $p_1x_1 + p_2x_2$

= 50,000 × 0.85 + (-20,000) × 0.5

= 42,500 – 10,000

= 32,500

132. If a random variable X has the following probability distribution, then the expected value of X is:

X	-1	-2	0	1	2
F(x)	1/6	1/6	1/5	1/6	1/3

June 2023

(a) 3/2 (b) 1/2 (c) 1/6 (d) 1/5

Answer:

(c)

x_1 :	-1	-2	0	1	2
P_1 :	1/3	1/6	1/5	1/6	1/3

Expected value of x

E(x) = $P_1 x_1$

= $P_1x_2 + P_2x_2 + P_3x_3 + P_4x_4 + P_5x_5$

$= \frac{1}{3} \times (-1) + \frac{1}{6}(-2) + \frac{1}{5} \times 0 + \frac{1}{6} \times 1 + \frac{1}{3} \times 2$

$= -\frac{1}{3} - \frac{2}{6} + 0 + \frac{1}{6} + \frac{2}{3}$

$= \frac{-2-2+0+1+4}{6} = 1/6$

133. If P(A) =1/2 and P(B) =1/3 and P(A ∪ B) =2/3 then find P(A ∩ B): dec 2023

(a) $\frac{1}{4}$ (b) $\frac{2}{3}$ (c) $\frac{1}{6}$ (d) $\frac{1}{2}$

Answer :

(c) Given P(A) = $\frac{1}{2}$, P(B) = $\frac{1}{3}$, P(A ∪ B)= $\frac{2}{3}$

P(A ∩ B) = ?

We know that

P(A ∪ B)= P(A) + P(B) – P(A ∩ B)

$\frac{2}{3} = \frac{1}{2} + \frac{1}{3} - P(A \cap B)$

$P(A \cap B) = \frac{1}{2} + \frac{1}{3} - \frac{2}{3}$

$= \frac{3+2-4}{6}$

$= \frac{1}{6}$

134. A box contain 20 electrical bulbs out of which 4 are defective. Two bulbs are chosen at random from this box. The probability that at least one of them defective. dec 2023

(a) $\frac{7}{19}$ (b) $\frac{4}{19}$ (c) $\frac{12}{9}$ (d) $\frac{15}{19}$

Answer :

(a) If

Total Electric Bulb = 20

No. of defective Bulb (4) | No. of good Bulb (20 – 4)=16

If two bulb are chosen at random from the box then No. of sample

Sample n(s) = 20_{c_2}

$= \frac{20\times19}{2\times1}$

= 190

Event. (A) = 'getting at least are defective bulb'

= (1 defective and 1 good or 2 defective and '0' good)

$n(A) = 4_{c_1} \times 16_{c_1} + 4_{c_2} \times 16_{c_0}$

$= \frac{4}{1} \times \frac{16}{1} + \frac{4\times3}{2\times1} \times 1$

= 64 + 6

n(A) = 70

$p(A) = \frac{n(A)}{n(S)} = \frac{70}{190} = \frac{7}{19}$

135. If a card is drawn at random from a pack of 52 cards, what is the chance of getting a Club or a King ? dec 2023

(a) $\frac{13}{52}$ (b) $\frac{4}{52}$ (c) $\frac{17}{52}$ (d) $\frac{16}{52}$

Answer :

(d) If one card is drawn at random from the pack of 52 cards. Then

No. of sample space n (s) = 52

Event (A) 'getting card is club or king'

n(A) = 16

$P(A) = \frac{16}{52}$

136. A number is selected from the first 30 natural numbers. What is the probability that it would be divisible by 3 or 8 ? dec2023

(a) 0.2 (b) 0.4 (c) 0.6 (d) 0.8

Answer:

(b) Here, A Number is selected from the first '30' Natural Numbers.

Then, $n(S) = 30_{c_1} = 30$

Event (A) = getting No. is divisible by 3 or 8 .

= { 3,6,9,12,15,18,21,24,27,30,8,16}

n(A) = 12

$P(A) = \frac{n(A)}{n(S)} = \frac{12}{30} = 0.4$

137. If $P(A \cap B) = \frac{1}{3}$, $P(A \cap B) = \frac{5}{6}$, $P(\bar{B}) = \frac{1}{2}$, then $P(\bar{A})$ is: dec 2023

(a) $\frac{2}{3}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) $\frac{3}{4}$

Answer :

(a) Given , $P(A \cap B) = \frac{1}{3}$, $P(A \cup B) = \frac{5}{6}$, $P(B) = \frac{1}{2}$

Then , $p(\bar{A})$= ?

$P(B) = 1 - \frac{1}{2} = \frac{1}{2}$

We know that

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\frac{5}{6} = P(A) + \frac{1}{2} - \frac{1}{3}$

$P(A) = \frac{5}{6} + \frac{1}{3} - \frac{1}{2}$

$P(A) = \frac{5+2-3}{6} = \frac{4}{6} = \frac{2}{3}$

138. A number is selected at random from the first 100 natural numbers. What is that probability that it would be a multiple of 3 or 7 ? dec 2023

(a) $\frac{33}{100}$ (b) $\frac{4}{100}$ (c) $\frac{21}{100}$ (d) $\frac{43}{100}$

Answer :

(d) If one No. is selected at random from the first 100 Natural Number. Then No. of sample spaces $n(S) = 100_{c1}=100$

A 'getting No. is divisible by 3

$n(A) = \frac{100}{3} = 33$

$P(A) = \frac{33}{100}$

B getting No. is divisible by 7

$n(B) = \frac{100}{7} = 14$

$P(B) = \frac{14}{100}$

$A \cap B$ = 'getting Number is divisible by'3 and 7 = (21)

$n(A \cap B) = \frac{100}{21} = 4$

$P(A \cap B) = \frac{4}{100}$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= \frac{33}{100} + \frac{14}{100} - \frac{4}{100}$

$= \frac{33+14-4}{100}$

$= \frac{43}{100}$

Answer Key

1.	c	2.	b	3.	c	4.	a	5.	c	6.	a	7.	a	8.	b	9.	d	10.	a
11.	d	12.	c	13.	d	14.	c	15.	c	16.	b	17.	a	18.	c	19.	a	20.	d
21.	d	22.	d	23.	b	24.	d	25.	c	26.	b	27.	c	28.	c	29.	c	30.	d
31.	c	32.	c	33.	b	34.	c	35.	b	36.	b	37.	c	38.	a	39.	d	40.	b
41.	b	42.	c	43.	b	44.	b	45.	d	46.	b	47.	c	48.	c	49.	a	50.	d
51.	b	52.	a	53.	b	54.	c	55.	a	56.	d	57.	a	58.	b	59.	a	60.	b
61.	c	62.	b	63.	a	64.	a	65.	d	66.	a	67.	a	68.	a	69.	a	70.	d
71.	b	72.	d	73.	c	74.	a	75.	b	76.	b	77.	b	78.	b	79.	a	80.	b
81.	a	82.	b	83.	b	84.	a	85.	d	86.	c	87.	d	88.	b	89.	d	90.	b
91.	a	92.	c	93.	d	94.	c	95.	c	96.	a	97.	d	98.	c	99.	c	100.	b
101.	c	102.	c	103.	d	104.	a	105.	a	106.	c	107.	c	108.	b	109.	c	110.	c
111.	c	112.	b	113.	b	114.	b	115.	a	116.	b	117.	b	118.	d	119.	c	120.	c
121.	c	122.	a	123.	b	124.	d												

CHAPTER
PROBABILITY (THEORETICAL) DISTRIBUTION
PAST YEAR QUESTIONS

1. What is the probability of making 3 correct guesses in 5 True - False answer type questions? **Nov-2006**
(a) 0.4156 (b) 0.32 (c) 0.3125 (d) 0.5235

2. The I.Q.'s of army volunteers in a given year are normally distributed with Mean = 110 and Standard Deviation = 10. The army wants to give advance training to 20% of those recruits with the highest scores. What is the lowest I.Q score acceptable for the advanced training? The value of Z for the area 0.3 = 0.84. **Nov - 2006**
(a) 0.84 (b) 118.4 (c) 138.4 (d) 115.4

3. The number of calls arriving at an internal switch board of an office is 96 per hour. Find the probability that there will be : **Nov - 2006**
(i) not more than 3 calls on the board,
(ii) at least three calls in a minute on the board.
[Given: $e^{-1.6} = 0.2019$]
(a) 0.08 and 0.92 respectively (b) 0.19 and 0.92 respectively
(c) 0.92 and 0.13 respectively (d) 0.92 & 0.22 respectively

4. For a normal distribution with mean 150 and S.D. 45; find Q_1 and Q_3: **Nov - 2006**
(a) 119.35 and 190.65 respective (b) 119.65 and 180.35 respective
(c) 180.35 and 119.65 respective (d) 123.45 and 183.65 respectively

5. The probability density function of a normal variable x is given by : **Nov - 2006**
(a) $f(x) = \frac{1}{\sigma\sqrt{2\pi}} . e^{\frac{-(x-\mu)^2}{2\sigma^2}}$ for $0 < x < \infty$ (b) $f(x) = \frac{1}{\sqrt{2\pi\sigma}} . e^{\frac{-(x-\mu)^2}{2\sigma^2}}$ for $-\infty < x < \infty$
(c) $f(x) = \frac{1}{\sigma\sqrt{2\pi}} . e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$ for $-\infty < x < \infty$ (d) None of these.

6. The Interval $(\mu - 3\delta, \mu + 3\delta)$ covers : **May - 2007**
(a) 95% area of normal distribution (b) 96% area of normal distribution
(c) 99% area of normal distribution (d) All but 0.27% area of a normal distribution

7. The overall percentage of failure in a certain examination is 0.30. What is the probability that out of a group of 6 candidates at least 4 passed the examination ? **May - 2007**
(a) 0.74 (b) 0.71 (c) 0.59 (d) 0.67

8. A manufacturer, who produces medicine bottles, finds that 0.1% of the bottles are defective. The bottles are packed in boxes containing 500 bottles. A drug manufacturer buys 100 boxes from the producer of bottles. Using Poisson distribution, find how many boxes will contains at least two defectives: **May - 2007** [Given: $e^{-0.5} = 0.6065$]
(a) 7 (b) 13 (c) 9 (d) 11

9. The number of methods of fitting the normal curve is : **Aug - 2007**
(a) 4 (b) 3 (c) 2 (d) 1

10. If the 1st quartile and Mean Deviation about median of a normal distribution are 13.25 and 8 respectively, then the mode of the distribution is : **Aug - 2007**
(a) 20 (b) 10 (c) 15 (d) 23

11. If X is a Poisson variate with P(X = 0) = P(X = 1), then P(X = 2) =: **Nov - 2007**
(a) 1/6e (b) e/6 (c) 1/2e (d) e/3

12. A sample of 100 dry battery cells tested to find the length of life produced the following results: $\bar{x} = 12\ hours, \sigma = 3\ hours$ What percentage of battery cells are expected to have life less than 6 hours? **Nov - 2007** [Area under the normal curve from z = 0 to z = 2 is 0.4772]
(a) 2.28% (b) 2.56% (c) 4.56% (d) 1.93%

13. The method usually applied for fitting a binomial distribution is known as : **Nov-2007**
(a) Method of probability distribution (b) Method of deviations
(c) Method of moments (d) Method of least squares.

14. In a certain manufacturing process, 5% of the tools produced turn out to be defective. Find the probability that in a sample of 40 tools, at most 2 will be defective :**Nov - 2007** [Given : e^{-2} = 0.135]
(a) 0.555 (b) 0.932 (c) 0.785 (d) 0.675

15. Examine the validity of the following :
Mean and standard Deviation of a binomial distribution are 10 and 4 respectively. **Nov - 2007**
(a) Not valid (b) Valid (c) Both (a) & (b) (d) Neither (a) nor (b)

16. An experiment succeeds twice as often as it fails. What is the probability that in next five trials there will be at least three successes ? **June - 2008**
(a) 33/81 (b) 46/81 (c) 64/81 (d) 25/81

17. The probability than a man aged 45 years will die within a year is 0.012. What is the probability that of 10 men, at least 9 will reach their 46th birthday? **June - 2008**
[Given : $e^{-0.12}$ = 0.88692]
(a) 0.0935 (b) 0.9934 (c) 0.9335 (d) 0.9555

18. For a certain normal variate X, the mean is 12 and S.D. is 4. Find P (X $\geq$ 20): [Area under the normal curve from z = 0 to z = 2 is 0.4772] **June - 2008**
(a) 0.5238 (b) 0.0472 (c) 0.7272 (d) 0.0228

19. In Poisson Distribution, probability of success is very close to : **June - 2008**
(a) -1 (b) 0 (c) 1 (d) None

20. If the mean of a Poisson variable X is 1, what is P (x = at least one)? **Dec - 2008**
(a) 0.456 (b) 0.821 (c) 0.632 (d) 0.254

21. What is the probability of getting 3 heads if 6 unbiased coins are tossed simultaneously? **Dec-2008**
(a) 0.3125 (b) 0.25 (c) 0.6875 (d) 0.50

22. In a Poisson distribution P (x = 0) = P (X = 2). Find E (x). **June - 2009**
(a) $\sqrt{2}$ (b) 2 (c) -1 (d) 0

Answer:

(a) E (x) stands for mean of the distribution.
Let x be a Poisson variate with parameter m.
The probability function of x is then given by:

$f(x) = \frac{e^{-m}.m^x}{x!}$ for x = 0, 1, 2 ..... as

now, P (x = 0) = P(x = 2)

f(0) = f(2)

$$\frac{e^{-m}.m^x}{0!} = \frac{e^{-m}.m^2}{2!}$$

$$\frac{m^0}{1} = \frac{m^2}{2}$$

$$1 = \frac{m^2}{2}$$

$m^2 = 2$

$m = \sqrt{2} \cong 1.414$

Therefore, the mean of this distribution is E(x) = m = $\sqrt{2}$

23. Shape of Normal Distribution Curve: **Dec-2009**
(a) Depends on its parameters (b) Does not depend on its parameters
(c) Either (a) or (b) (d) Neither (a) nor (b)

Answer:

(a) Shape of the Normal Distribution curve depends on its parameters. [self-explanatory].

24. For binomial distribution E(x) = 2, V (x) = 4/3. Find the value of n. **Dec-2009**
(a) 3 (b) 4 (c) 5 (d) 6

Answer:

(d) E(x) = np = 2

v(x) = npq = 4/3.

np = 2 ……(1)

$npq = \frac{4}{3}$

substituting the value of np from (1);

$2 \times q = \frac{4}{3}$

$2q = \frac{4}{3}$

$q = \frac{4}{3\times 2} = \frac{2}{3}$

$\therefore q = \frac{2}{3}$

$P = 1 - q = 1 - \frac{2}{3} = \frac{1}{3}$

np = 2

$n \times \frac{1}{3} = 2$

n = 6

∴ n = 6

25. What are the parameters of binomial distribution? **Dec-2009**

(a) n (b) p (c) Both n and p (d) None of these

Answer:

(c) Binomial Distribution is a biparamatric, distribution, characterized by 'n' and 'p' [self-explanatory].

26. The Variance of standard normal distribution is **June-2010**

(a) 1 (b) μ (c) σ^2 (d) 0

Answer:

(a) In standard normal distribution

Mean = 0

Variance = 9

27. For a Poisson distribution P (x = 3) = 5 P(x = 5), then S.D. is **June-2010**

(a) 4 (b) 2 (c) 16 (d) $\sqrt{2}$

Answer:

(d) Let x be a Poisson variate with parameter m. The probability function of x is then given by :

$f(x) = \frac{e^{-m}m^x}{x!}$ for x = 0, 1, 2 …… as now,

P(x=3) = 5P (x=5)

f(3) = 5f (5)

$\frac{e^{-m}m^3}{3!} = \frac{5e^{-m}m^5}{5!}$

$20 = 5m^2$

$m^2 = 4$

Variance = m = 2

∴ SD = $\sqrt{\text{Variance}}$

SD = $\sqrt{2}$

28. For a Binomial distribution B (6, p), P(x = 2) = 9p(x = 4), then P is **June-2010**

(a) 1/2 (b)1/3 (c) 10/13 (d) ¼

Answer:

(d) We are given that n = 6. The probability mass function of x is given by

$f(x) = {}^nc_x\, p^x\, q^{n-x}$

$= {}^6c_x\, p^x\, q^{6-x}$, for x = 0, 1, 2 ……., 6

Thus, $P(x=2) = f(2) = {}^6c_2\, p^2\, q^{6-2} = 15\, p^2 q^4$

and $P(x=4) = f(4) = {}^6c_4\, p^4\, q^{6-4} = 15\, p^4 q^2$

Hence, P(x =2) = 9P(x =4)

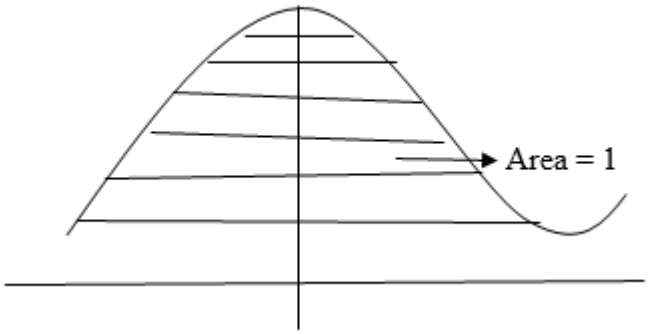
$15p^2q^4 = 9.15\, p^4q^2$

$15p^2q^2 (q^2 - 9p^2) = 0$
$q^2 - 9p^2 = 0$ (as $p \neq 0$ and $q \neq 0$)
$(1- p)^2 - 9p^2 = 0$ (as $q = 1-p$)
$(1- p + 3p) = 0$ or $(1- p - 3q) = 0$
$P = - ½$ or $p = ¼$
Thus, $p = ¼$ (as $p \neq - ½$)

29. In Binomial distribution n = 9 and P = 1/3, what is the value of variance: **June-2010**
(a) 8 (b) 4 (c) 2 (d) 16
Answer:
(c) In Binominal distribution,
Variance = npq
n = 9
$p = \frac{1}{3}$
$q = \frac{2}{3}$
$\therefore$ Variance = $9 . \frac{1}{3} . \frac{2}{3} = 2$

30. If standard deviation of a poisson distribution is 2, then its **Dec-2010**
(a) Mode is 2 (b) Mode is 4 (c) Modes are 3 and 4 (d) Modes are 4 and 5
Answer:
(c) Given σ = S.D. = 2 => Variance = $\sigma^2 = 4$
$\because$ In poisson distribution
Mean = Variance
$\because$ m = 4, which is an integer
$\because$ it is bi-modal
Modes are m and (m- 1)
hence, 4 and 3.

31. The area under the Normal curve is **Dec-2010**
(a) 1 (b) 0 (c) 0.5 (d) -1
Answer:
(a) Area under the Normal curve = 1



32. For a normal distribution $N(\mu, \sigma^2), P(\mu - 3\sigma < x < \mu + 3\sigma)$ is equal to **Dec-2010**
(a) 0.9973 (b) 0.9546 (c) 0.9899 (d) 0.9788
Answer:
(a) We know that
$P(\mu - 3\sigma < x < \mu + 3\sigma)$
= 0.9973

33. If for a Binomial distribution B (n. p,)the mean = 6 and Variance = 2 then "p" is **Dec-2010**
(a) 2/3 (b) 1/3 (c) 3/5 (d) ¼
Answer:
(a) Mean = 6 = np
Variance = 2 = npq
$\frac{npq}{np} = \frac{2}{6} \Rightarrow q = \frac{1}{3}$
{For Binomial Distribution}

$p = 1 - q = 1 - \frac{1}{3} = \frac{2}{3}$

$p = \frac{2}{3}$

34. If the inflexion points of a Normal Distribution are 6 and 14. Find its Standard Deviation ? **June - 2011**

(a) 4 (b) 6 (c) 10 (d) 12.

Answer:

(a) ∵ The inflexion points of a Normal Distribution are given as

$(\mu + \sigma)$ and $(\mu - \sigma)$

here, we are given:

$\mu + \sigma = 14$ (1)

and, $\mu - \sigma = 6$ (2)

Solving (1) and (2) we get

$\mu = 10$ and $\sigma = 4$

Hence S.D (σ) = 4

35. In a Binomial Distribution, if mean is k-times the variance, then the value of 'k' will be _____. **June - 2011**

(a) p (b) 1/p (c) 1 – p (d) $\frac{1}{1-p}$

Answer:

(d) In Binomial Distribution :

Mean = np & Variance = npq

by question, here

Mean = K.

Variance np = K. npq

∴ K = 1/q

∴ K = $\frac{1}{1-p}$ [∴ p + q =1]

36. If x~N (3,36) and y~N (5,64) are two independent Normal variate with their standard parameters of distribution, then if (x + y) ~ N (8,A) also follows normal distribution. The value of A will be _____. **June - 2011**

(a) 100 (b) 10 (c) 64 (d) 36

Answer:

(b) We Know,

If $x \sim N(\mu_1\ \sigma_1^2)$ and $y \sim N(\mu_2, \sigma_2^2)$

Then

$x + y \sim N\left(\mu_1 + \mu_2, \sqrt{\sigma_1^2 + \sigma_2^2}\right)$

Where $\sim N(\mu, \sigma)$

(Say)

$\mu = (\mu_1 + \mu_2)$ and $\sigma = (\sqrt{\sigma_1^2 + \sigma_2^2})$

Here, x ~ N (3,36) and y ~ N(5,64)

∴ x + y ~ N (3 + 5, $\sqrt{36 + 64}$ = N (8, A)

=> A = $\sqrt{36 + 64}$

∴ A = 10

37. The mean of Binominal distribution is 20 and Standard deviation is 4 then; **Dec-2011**

a) n = 100, p = 1/5, q = 4/5 b) n = 50, p = 2/5, q = 2/5

c) n = 100, p = 2/5, q = 4/5 d) n = 100, p = 1/5, q = 3/5

Answer:

(a) Here,

Mean = 20 S.D. = 4

np = 20 ……(1) Variance = $(4)^2$

Variance = 16

npq = 16 ……(2)

Divide (2)/(1)

$\frac{npq}{np} = \frac{16}{20}$

q $= \frac{4}{5}$

p = 1- q

$= 1 - \frac{4}{5}$

P $= \frac{1}{5}$

Putting the value of p in eq(1)

n $\times \frac{1}{5} = 20$

n = 20×5 = 100

38. A Company has two cars which it hires out during the day. The number of Cars demanded in a day has poisson distribution with mean 1.5. Then percentage of days on which only one car was in demand is equal to **Dec-2011**

a) 23.26 b) 33.47 c) 44.62 d) 46.40

Answer:

(b) Given the mean Poisson distribution (m) = 1.5

Then

Poisson parameter (μ) = m = 1.5

We know by Poisson distribution

P(x) = $\frac{e^{-m}m^x}{x!}$

Here

m = 1.5, x = 1

P(1) = $\frac{e^{-1.5}.(1.5)}{1.!}$

$= \frac{0.2231\times1.5}{1}$

= 0.33465

= 0.3347

% of P(1) = 0.3347 × 100 % = 33.47%

39. The binominal distribution with mean 3 & variance 2 is : **Dec-2011**

a) $\left(\frac{2}{7}+\frac{1}{7}\right)^{n\to9}$ b) $\left(\frac{2}{6}+\frac{1}{6}\right)^{n\to9}$ c) $\left(\frac{2}{3}+\frac{1}{3}\right)^{n\to9}$ d) $\left(\frac{2}{5}+\frac{1}{5}\right)^{n\to9}$

Answer:

(c) Given mean $= 3$

$np = 3$

Variance $= 2$

$npq = 2$

Divide $(2)/(1)$ we get

$\frac{npq}{np} = \frac{2}{3} \Rightarrow q = \frac{2}{3}$

$p = 1 - q$

$p = 1 - \frac{2}{3} = \frac{1}{3}$

Putting the value of p in Equation (1)

$n \times \frac{1}{3} = 3$

$n = 9$

The Binomial distribution is

$$(q+p)^n = \left[\frac{2}{3}+\frac{1}{3}\right]^9$$

40. For binomial distribution **June-2012**

(a) Variance < Mean (b) Variance =Mean (c) Variance > Mean (d) None of the above

Answer:

(a) For Binomial distribution

npq < np

Variance < Mean

41. If x is a Poisson variate and E(x) = 1, then P(x > 1) is **June-2012**

(a) $1-\frac{e^{-1}}{2}$ (b) $1-e^{-1}$ (c) $1-2e^{-1}$ (d) $1-\frac{5}{2}e$

Answer:

(c) E(x) = 1, we know P(x) = $\frac{e^{-m}m^x}{L_x}$; E(x) = m

$\therefore$ P(x >1) = 1- P(x <1)

= 1 – [P(x=0) + P(x=1)]

= 1 - $\left[\frac{e^{-1}\cdot 1^0}{L^0}+\frac{e^{-1}\cdot 1^1}{L^1}\right]$

= 1 – [e^{-1} + e^{-1}]

= 1 – 2e^{-1}

42. The mean and the variance of a random variable X having the probability density function $P(X-x)=\exp\{-(x-4)^2\}/\sqrt{\pi}, -\infty<x<\infty$ is. **June-2012**

(a) 4, $\frac{1}{2}$ (b) 4, $\frac{1}{\sqrt{2}}$ (c) 2, 2 (d) 2, $\frac{1}{2}$

Answer:

(a) We know, the probability distribution function for normal distribution is:

P(X = x) = $\frac{1}{\sigma\sqrt{2\pi}}\, e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$, $-\infty < x < \infty$

Given in equation:

P(X = x) = $\frac{1}{\sqrt{\pi}}\, e^{-(x-4)^2}$

Comparing given function with the standard form, we get

Mean (u) = 4

S.D. (σ) = $\frac{1}{\sqrt{2}}$

$\therefore$ Variance (σ^2) = $\frac{1}{2}$

43. In a Normal Distribution **Dec-2012**

(a) The first and second quartile are equidistant from median

(b) The second and third quartiles are equidistant from the median

(c) The first and third quartiles are equidistant from the median

(d) None of the above

44. If parameters of a binomial distribution are n and p then, this distribution tends to a Poisson distribution when **Dec-2012**

(a) n $\to \infty$, p $\to$ 0 (b) p $\to$ 0,np = λ

(c) n $\to \infty$, np = λ (d) n $\to \infty$, p $\to$ 0, np = λ

Answer:

(d) If parameters of a binomial distribution are n and p then this distribution tends to a Poisson distribution when

$n \to \infty, p \to 0, np = A$

Where 'A' is a finite constant

45. If a random variable x follows Poisson distribution such that E(x) = 30, the variance of the distribution is **Dec-2012**

(a) 7 (b) 5 (c) 30 (d) 20

Answer:

(c) In Poisson distribution

Mean = Variance

∵ E(x) = 30

Mean = E(x) = 30

So, Variance = 30

46. In a normal distribution quartile deviation is 6, the standard deviation will be **Dec-2012**

(a) 4 (b) 9 (c) 7.5 (d) 6

Answer:

(b) In normal distribution

4 S.D. = 6 Q.D.

$S.D. = \frac{6}{4}$ Q.D.

$= \frac{6}{4} \times 6$

$= 9$

47. The mode of the Binomial Distribution for which the mean is 4 and variance 3 is equal to? **June-2013**

a) 4 b) 4.25 c) 4.5 d) 4.1

48. For Poisson Distribution: **June-2013**

a) Mean and Standard Deviations are equal b) Mean and variance are equal

c) Standard Deviation and variance are equal d) Both (a) and (b) are correct

49. Which of the following is not a characteristic of a normal probability distribution? **June-2013**

a) Mean of the normally distributed population lies at the centre of its normal curve.

b) It is multi-modal

c) The mean, median and mode are equal

d) It is a symmetric curve

50. An approximate relation between quartile deviation (QD) and standard deviation (S.D.) of normal distribution is: **June-2013**

a) 5 QD = 4 SD b) 4 QD = 5 SD c) 2 QD = 3 SD d) 3 QD = 2 SD

Answer:

(d) We know that

In normal distribution

4 S.D = 5 M.D = 6 Q.D

So 4 S.D = 6 Q.D

2 S.D = 3 Q.D

or 3 Q.D = 2 S.D

51. In a certain Poisson frequency distribution, the probability corresponding to two successes is half the probability corresponding to three successes. The mean of the distribution is **Dec-2013**

(a) 6 (b) 12 (c) 3 (d) 2.45

Answer:

(a) Given

$P(x=2) = \frac{1}{2} P(x=3)$

$2\ P(x=2) = P(x=3)$

$2. \frac{e^{-m}.m^2}{2!} = \frac{e^{-m}.m^3}{3!}$

$\frac{2}{2} = \frac{m}{6}$

$m = 6 \times \frac{2}{2} = 6$

52. Mean & Variance of a binomial variance are 4 and $\frac{4}{3}$ respectively then $P(x \geq 1)$ will be _____. **June-2014**

(a) $\frac{728}{729}$ (b) $\frac{1}{729}$ (c) $\frac{723}{729}$ (d) None

Answer:

(a) For Binomial Variable

Mean = np = 4 ……(1)

Variance = npq = $\frac{4}{3}$ ……(2)

From (1) & (2)

$4 \times q = \frac{4}{3}$

$q = \frac{1}{3}$

$p = 1 - \frac{1}{3} = \frac{2}{3}$

$np = 4$

$n \times \frac{2}{3} = 4$

$n = \frac{12}{2} = 6$

$p(x \geq 1) = 1 - p(x < 1)$

$= 1 - p(x = 0)$

$= 1 - {}^{6}C_0 \cdot \left(\frac{2}{3}\right)^0 \cdot \left(\frac{1}{3}\right)^6$

$= 1 - |x| \times \frac{1}{729} = 1 - \frac{1}{729} = \frac{728}{729}$

53. 5,000 students were appeared in an examination. The mean of marks was 39.5 with Standard Deviation 12.5 marks. Assuming the distribution to be normal, find the number of students recorded more than 60% marks **June-2014**

[Given: When Z = 1.6, Area of normal curve = 0.4494]

a) 1,000 b) 505 c) 253 d) 2,227

Answer:

(c) Probability that students recorded more than 60% marks = P (x >60)

$= 1 - P(x \leq 60)$

$= 1 - P\left(\frac{x-\bar{x}}{\sigma} \leq \frac{60-39.5}{12.5}\right)$

$= 1 - P(Z \leq 1.64)$

$= 1 - \phi(1.64)$

$= 1 - (0.4495 + 0.5)$

$= 1 - 0.9495$

$= 0.0505$

Thus, the Number of students having marks more than 60 %

$= 5000 \times 0.0505$

$= 252.5$

54. If a variate X has, mean > variance, then its distribution will be _____. **June-2014**

a) Binomial distribution b) Poisson distribution c) Normal distribution d) t-distribution

Answer:

(a) In Binomial distribution

Mean > Variance

55. If six coins are tossed simultaneously. The probability of obtaining exactly two heads are : **Dec-2014**

a) $\frac{1}{64}$ b) $\frac{63}{64}$ c) $\frac{15}{64}$ d) None of these

Answer:

(c) Here Total trial (n) = 6

For coin p = ½ , q = 1 – ½ = ½

$P(X = x) = {}^{n}C_x \, p^x \cdot q^{n-x}$

$P(X = 2) = {}^{6}C_2 \left(\frac{1}{2}\right)^2 \times \left(\frac{1}{2}\right)^{6-2}$

$= \frac{6 \times 5}{2 \times 1} \times \left(\frac{1}{2}\right)^2 \times \left(\frac{1}{2}\right)^4$

$= 15 \times \left(\frac{1}{2}\right)^{2+4}$

$= 15 \times \left(\frac{1}{2}\right)^6$

$= \left(\frac{15}{64}\right)$

56. If X and Y are two independent Normal random variables, then the distribution of X+Y is **Dec-2014**

a) Normal distribution b) T-distribution c) Chi-Square distribution d) F-distribution

57. For a normal distribution having mean = 2 and variance = 4, the fourth central moment μ_4 is : **Dec-2014**

a) 16 b) 32 c) 48 d) 64

Answer:

(c) For Normal Distribution Mean = 2, Variance = 4

Fourth central moments μ_4 = ?

We know that Normal curve is always

Meso kuritic then $\beta_2 = 3$

moment coefficient of kurtosis

$(\beta_2) = \frac{\mu_4}{\mu_2^2}$

Here, μ_2 = Variance = 4, $\beta = 3$

$3 = \frac{\mu_4}{4^2}$

$\mu_4 = 3 \times 4^2 = 3 \times 16 = 48$

Shortcut: Fourth moments $\mu_4 = 3\sigma^4 = 3(4)^2 = 48$

58. For a Binomial distribution with mean = 4 and variance = 3, the 3rd central moment μ_3 is **Dec-2014**

a) 5/2 b) 7/4 c) 3/2 d) 1/3

59. If x is a binomial variable with parameters n and p, then x can assume **June-2015**

a) Any value between 0 and n

b) Any value between 0 and n, both inclusive

c) Any whole number between 0 and n, both inclusive

d) Any number between 0 and infinity

60. In _____ distribution, mean = variance **June-2015**

a) Normal b) Binomial c) Poisson d) None

61. Under a normal curve $\bar{x} \pm 3\sigma$ covers _____ **June-2015**

a) 100% of the area (item values) b) 99%

c) 99.73% d) 99.37%

62. If 'x' is a binomial variable with parameter 15 and 1/3, then the value of the mode of the distribution : **Dec-2015**

a) 5 b) 5 and 6 c) 5.50 d) 6

Answer:

(a) In Binomial Variable (Distribution)

$x \sim B(n, p)$

$x \sim B(15, \frac{1}{3})$

$n = 15, P = \frac{1}{3}$

Mode $= (n + 1) P$

$= (15 + 1) . \frac{1}{3}$

$= 16 \times \frac{1}{3} = 5.33$ (which is non Integer)

$= 5$

63. Standard deviation of binomial distribution is : **Dec-2015**

a) $\sqrt{np}$ b) $(np)^2$ c) $\sqrt{npq}$ d) $(npq)^2$

64. The wages of workers of factory follows : **Dec-2015**

a) Binomial distribution b) Poisson distribution

c) Normal distribution d) Chi-square distribution

65. The normal curve is: **June-2016**

a) Positively skewed b) Negatively skewed c) Symmetrical d) All these

66. For a Poisson variate X, P (X = 1) = P (X = 2), what is the mean of X ? **June-2016**

a) 1 b) 3/2 c) 2 d) 5/2

Answer:

(c) For x ~ P(m)

$P(x=1) = P(x=2)$

$$\frac{e^{-m}.m^1}{1!} = \frac{e^{-m}.m^2}{2!}$$

$$\frac{m}{1} = \frac{m^2}{2}$$

$$\boxed{m = 2}$$

67. In a discrete random variable X follows uniform distribution and assumes only the values 8, 9, 11, 15, 18, 20. Then P ($X \leq 15$) is ____ **June-2016**

a) 1/2 b) 1/3 c) 2/3 d) 2/5

Answer:

(c) Given data

8, 9, 11, 15, 18, 20

Total No. of data n(s) = 6

$$P(x \leq 15) = \frac{n(A)}{n(B)} = \frac{4}{6} = \frac{2}{3}$$

68. If x and y are independent normal variates with mean and Standard Deviation as μ_1 and μ_2 and σ_1 and σ_2 respectively, then z = x + y also follows normal distribution with **Dec-2016**

a) Mean = $\mu_1 + \mu_2$ and S.?D. = 0 respectively b) Mean = 0 and S.D. = $\sigma_1^2 + \sigma_2^2$

c) Mean= $\mu_1 + \mu_2$ and S.D. = $\sqrt{\sigma_1^2 + \sigma_2^2}$ d) None of these.

Answer:

(c) If x and y are two Independent variables of Normal Distribution

if $x \sim N(\mu_1, \sigma_1^2)$

and $y \sim N(\mu_2, \sigma_2^2)$

then z = x +y

$z = N(\mu_1, \sigma_1^2) + N(\mu_2, \sigma_2^2)$

$z = N(\mu_1+\mu_2 , \sigma_1^2+ \sigma_2^2)$

Mean = $\mu_1+\mu_2$, Variance = $\sigma_1^2+ \sigma_2^2$

S.D = $\sqrt{\sigma_1^2 + \sigma_2^2}$

69. Name the distribution which has Mean = Variance **Dec-2016**

(a) Bionomial (b) Poisson (c) Normal (d) Chi-square

70. An example of a bi-parametric probability distribution: **Dec-2016**

(a) Bionomial (b)Poisson (c)Normal (d) (a) and (c)

71. If x ~N (50, 16), then which of the following is not possible: **June-2017**

a) P (x >60) = 0.002 b) P (x <50) = 0.50

c) P (x <60) = 0.40 d) P (x >50) = 0.50

72. If for a distribution mean = variance, then the distribution is said to be: **June-2017**

a) Normal b) Binomial c) Poisson d) None of the above

73. For a binomial distribution if variance = $(\text{mean})^2$, then the values of n and p will be: **June-2017**

a) 1 and 1/2 b) 2 and 1/2 c) 3 and 1/2 d) 1 and 1

74. In normal distribution 95% observations lies between _____ & _____: **Dec-2017**

(a) (μ - 2 σ, μ + 2 σ) (b) (μ - 3 σ μ + 3 σ)

(c) (μ - 1.96 σ, μ + 1.96 σ) (d) (μ - 2.58 σ, μ + 2.58 σ)

75. An example of a bi-parametric discrete probability distribution is: **Dec-2017**

(a) Binomial distribution (b) Poisson distribution
(c) Normal distribution (d) Both (a) & (b)

76. In _____ distribution, mean = variance: **Dec-2017**
(a) Binomial (b) Poisson (c) Normal (d) None of these

77. The variance of a binomial distribution with parameters n and p is : **May-2018**
(a) $np^2(1-p)$ (b) $\sqrt{np-(I-p)}$ (c) nq(1-q) (d) $n^2p^2(1-P)^2$

78. X is a poisson variate satisfying the following condition 9 P(X = 4) + 90 (X = 6) = P (X = 2). What is the value of P(X ≤ 1)? **May-2018**
(a) 0.5655 (b) 0.6559 (c) 0.7358 (d) 0.8201

Answer:

(c) Given X ~ P(m)

P(x =2) = 9 P(x =4) + 90 P(x =6)

$$\frac{e^{-m}.m^2}{2!} = \frac{9.e^{-m}.m^4}{4!} + \frac{90.e^{-m}.m^6}{6!}$$

$$\frac{90.e^{-m}.m^6}{6!} + \frac{9.e^{-m}.m^4}{4!} - \frac{e^{-m}.m^2}{2!} = 0$$

$$e^{-m}.m^2\left[\frac{90.m^4}{6!} + \frac{9.m^2}{4!} - \frac{1}{2!}\right] = 0$$

$$e^{-m}.m^2\left[\frac{90.m^4}{720} + \frac{9.m^2}{24} - \frac{1}{2}\right] = 0$$

$$\frac{e^{-m}.m^2}{2}\left[\frac{90.m^4}{360} + \frac{9.m^2}{12} - 1\right] = 0$$

$$\frac{e^{-m}.m^2}{2}\left[\frac{m^4}{4} + \frac{3m^2}{4} - 1\right] = 0$$

$$\frac{e^{-m}.m^2}{2}\left[\frac{m^4+3m^2-4}{4}\right] = 0$$

$$\frac{e^{-m}.m^2}{8}(m^4+3m^2-4) = 0$$

$$m^4+3m^2-4 = 0$$

$$m^4+4m^2-m^2-4 = 0$$

$$m^2(m^2+4)-1(m^2+4) = 0$$

$$(m^2+4)(m^2-1) = 0$$

if $m^2+4=0$ if $m^2-1=0$

$m^2 = -4$ if $m^2 = +1$

$m^2 = \pm\sqrt{1}$

$m^2 = \pm 1$

m = $(\because m > 0)$

79. An example of a bi-parametric discrete probability distribution is **May-2018**
(a) binomial distribution (b) Poisson distribution
(c) normal distribution (d) both (a) and (b)

80. Probability distribution may be **May-2018**
(a) discrete (b) continuous (c) infinite (d) (a) or (b)

81. If the area of standard normal curve between z = 0 to z = 1 is 0.3413, then the value of ϕ (1) is. **May-2018**
(a) 0.5000 (b) 0.8413 (c) - 0.5000 (d) 1

82. For a Poisson variate X, P(X = 2) = 3P (X = 4), then the standard deviation of X is **Nov-2018**
(a) 2 (b) 4 (c) $\sqrt{2}$ (d) 3

Answer:

(c) For a Poission Variate X,

P(x = 2) = 3P (x = 4),

$$\frac{e^{-m}m^2}{2!} = \frac{3e^{-m}m^4}{4!}$$

$$\frac{m^2}{2} = \frac{3m^4}{24}$$

$6\,m^4 = 24m^2$

$m^2 = \frac{24}{6}$

$m^2 = 4$

m = 2

S.D $= \sqrt{m} = \sqrt{2}$

83. The mean of the Binomial distribution B $\left(4, \frac{1}{3}\right)$ is equal to **Nov-2018**

(a) $\frac{3}{5}$ (b) $\frac{8}{3}$ (c) $\frac{3}{4}$ (d) $\frac{4}{3}$

84. If for a normal distribution $Q_1 = 54.52$ and $Q_3 = 78.86$, then the median of the distribution is **Nov-2018**

(a) 12.17 (b) 39.43 (c) 66.69 (d) None of these

Answer:

(c) For a Normal Distribution

$Q_1 = 54.52$ and $Q_3 = 78.86$

We known that

$Q_1 = \mu - 0.675 = 54.52$ .....(1)

$Q_3 = \mu - 0.675 = 78.86$ .....(2)

On Adding

$2\mu = 133.38$

$\mu = \frac{133.38}{2}$

$\mu = 66.69$

In Normal Distribution Mean, Median and Mode are equal.

So, Median = Mean = 66.69

85. What is the mean of X having the following density function? **Nov-2018**

$(x) = \frac{1}{4\sqrt{2x}} e^{\frac{(x-10)^2}{32}}$ for $-\infty < x < \infty$

(a) 10 (b) 4 (c) 40 (d) None of the above

Answer:

(a) Given Normal distribution

$f(x) = \frac{1}{4\sqrt{2\pi}} e^{\frac{-(x-10)^2}{32}}$ for $-\infty < x < \infty$

On comparing from

$f(x) = \frac{1}{\sigma\sqrt{2\pi}} . e^{\frac{-(x-\mu)^2}{2\sigma^2}}$

We get:

Mean $(\mu) = 10$

86. The probability that a student is not a swimmer is $\frac{1}{5}$, then the probability that out of five students four are swimmer is **Nov-2018**

(a) $\left(\frac{4}{5}\right)^4 \left(\frac{1}{5}\right)$ (b) ${}^5C_1 \left(\frac{1}{5}\right)^4 \left(\frac{4}{5}\right)$

(c) ${}^5C_4 \left(\frac{4}{5}\right)^1 \left(\frac{1}{5}\right)^4$ (d) None of the above

Answer:

(d) Given :

Probability that a student is not a swimmer (q) = $\frac{1}{5}$

Probability that a student is a swimmer (p) = 1 – q = 1 - $\frac{1}{5} = \frac{4}{5}$

Total No. of students (n) = 5

P(Exactly 4 students are swimmer)

$= P(x = 4) = {}^5C_4 . \left(\frac{4}{5}\right)^4 \left(\frac{1}{5}\right)^1$

{$\because P(x = n) = {}^nc_x . p^x . q^{n-x}$} So, ans. (d)

87. 4 coins were tossed 1600 time. What is the probability that all 4 coins do not turn head upward at a time? **June-2019**

(a) $1600\ e^{-100}$ (b) $1000\ e^{-100}$ (c) $100\ e^{-1600}$ (d) e^{-100}

Answer:

(d) Probability of getting a head in a throw of a coin = $\frac{1}{2}$

Probability of getting 4 heads in a throw of four coins = $\frac{1}{2^4} = \frac{1}{16}$

Here, n = 1600

Mean = m = np

$= 1600 \times \frac{1}{16}$

$= 100$

P(No. Head) = P(X 20)

$= \frac{e^{-100} \cdot (100)^0}{01}$

$= \frac{e^{-100} \cdot 1}{1}$

$= e^{-100}$

88. If mean and variance are 5 and 3 respectively then relation between p and q is : **June-2019**

(a) p > q (b) p < q (c) p = q (d) p is symmetric

Answer:

(b) Mean = 5, Variance = 3

np = 5 …(1) , npq = 3 …(2)

eq(2)/ eq(1)

$\frac{npq}{np} = \frac{3}{5}$

q = 3/5

p = 1 –q

= 1 – 3/5 = 2/5

Here, p < q

89. In a Poisson distribution if P(x = 4) = P(x = 5) then the parameter of Poisson distribution is : **June-2019**

(a) $\frac{4}{5}$ (b) $\frac{5}{4}$ (c) 4 (d) 5

Answer:

(d) In Poisson distribution

P(x = 4) P(x = 5)

$\frac{e^{-m}m^4}{4!} = \frac{e^{-m}m^5}{5!}$

$\frac{1}{4!} = \frac{m}{5!}$

$\frac{1}{24} = \frac{m}{120}$

24m = 120

m = 5

90. If the points of inflexion of a normal curve are 40 and 60 respectively, then its mean deviation is **June-2019**

(a) 8 (b) 45 (c) 50 (d) 60

Answer:

(a) If the point of Inflexion of a Normal Distribiution are 40 and 60.

Then

$\mu - \sigma = 40$ _____(1)

$\mu + \sigma = 60$ _____(2)

Solving eq.(1) and eq.(2) we get

$\mu = 50$, $\sigma = 10$

Then M.O $= \frac{4}{5}$ S.D.

$= \frac{4}{5} \times 10$

$= 8$

91. Area under $M + 3\sigma$ **Nov-2019**

(a) 99.73% (b) 99% (c) 100% (d) 99.37%

Answer:

(a) We know that 99.73 per cent of values of a normal variable lies between (u - 3σ)

and $(u + 3\sigma)$

Thus probability that a value of x lies. Outside the limit is as low as (100 – 99.73) = 0.27%

92. For a Poisson distribution : **Nov-2019**

(a) Mean and SD are equal (b) Mean and variance are equal

(c) SD and Variance (d) Both a and b

Answer:

(b) Poisson distribution is theoretical discrete probability distribution which can describe many processes

Mean is given by m.i.e, U = m

Variance is also given by m.i. $\sigma^2 = m$

So in pass on distribution mean and variance are equal.

93. Find mode when n = 15 p = $\frac{1}{4}$ in binomial distribution? **Nov-2019**

(a) 4 (b) 4 and 3 (c) 4.2 (d) 3.75

Answer:

(b) In binomial distribution,

$m = (n + 1)\, p$

$m = (15 + 1) \times \frac{1}{4}$

$m = 4$

Since 4 is a integar so there. will 2 modes

4 and (4 – 1)

Mode = 4 and 3

94. In Poison distribution, if P (x = 2) = $\frac{1}{2}$ P (x = 3) find m? **Nov-2019**

(a) 3 (b) 1/6 (c) 6 (d) 1/3

Answer:

(c) In Poisson distribution $P(x = x) = \frac{e^{-m} \cdot m^2}{x!}$

Here $P(x = 2) = \frac{1}{2} P(x = 3)$

$$\frac{e^{-m} \cdot m^2}{2!} = \frac{1}{2} \times \frac{e^{-m} \cdot m^3}{3!}$$

$$\frac{e^{-m} \cdot m^2}{2!} = \frac{1}{2} \frac{x e^{-m} \cdot m^3}{2 \times 6}$$

m = 6

95. In a binomial distribution B(n, p) **Nov-2019** n = 4 P(x = 2) = 3× P (x = 3) find p

(a) 1/3 (b) 2/3 (c) 6/4 (d) 4/3

Answer:

(a) n = 4

we know $P(x = r) = {}^{n}C_r\, (p)^r\, (q)^{n-r}$

here $p(x = 2) = 3 \times P(x = 3)$

$${}^4c_2 \,.\, (p)^2\, (q)^{4-2} = 3 \times {}^4c_3\, (p)^3\, (q)^1$$

$$\frac{4!}{(4-2)1 \times 2!}\, (p)^2 (1-p)^2 = 3 \times \frac{4!}{(4-3)1 \times 3!} \times\, (p)^3 (1-p)$$

Since ${}^{n}c_r = \frac{n!}{(n-r)!1 \times r!}$

$6 \times (1 - p) = 3 \times 4p$

$6 - 6p = 12p$

$18p = 6$

$p = \frac{1}{3}$

96. What is the SD and mean of x **Nov-2019**

if $f(x) = \frac{\sqrt{2}}{\sqrt{\pi}} e^{-2(x-3)^2}, -\infty < x < \infty.$

(a) $3, \frac{1}{2}$ (b) $3, \frac{1}{4}$ (c) $2, \frac{1}{2}$ (d) $2, \sqrt{2}$

Answer:

(a) The standard form of probability density function is

$f(x) = \frac{1}{\sqrt{2\pi}} \cdot e^{\frac{-(x-\mu)^2}{2\sigma^2}}$ ----------(1)

Here, $\sqrt{\frac{2}{\pi}} \cdot e^{-2(x-3)^2}$

$= \sqrt{\frac{2}{\pi}} \cdot e^{-\left(\frac{1-3}{1/2}\right)^2}$

on comparing with Equation ----------(1)

$2\sigma^2 = \frac{1}{2}$ u = 3

$\sigma^2 = \frac{1}{4}$

$\sigma = \frac{1}{2}$

So SD = $\frac{1}{2}$, mean = 3

97. Which of the following is uni-parametric distribution? **Nov – 2020**

(a) Poisson (b) Normal (c) Binomial (d) Hyper geometric

98. If the probability of success in a binomial distribution is less than one-half, then the binomial distribution _____ , **Nov – 2020**

(a) is skewed to left (b) is skewed to right

(c) has two modes (d) has median at a point > mean + 1/2

99. If we change the parameter(s) of a _____ distribution the Shape of probability curve does not change. **Nov – 2020**

(a) Normal (b) Binomial (c) Poisson (d) Non-Gaussion

100. Which one of the following has Poisson distribution? **Nov – 2020**

(a) The number of days to get a complete cure.

(b) The number of defects per meter on long roll of coated polythene sheet.

(c) The errors obtained in repeated measuring of the length of a rod.

(d) The number of claims rejected by an insurance agency.

101. For a Poisson distributed variable X. we have P (X = 7) = 8 P(X = 9), the mean of the distribution is:

(a) 3 (b) 4 (c) 7 (d) 9

Answer:

(a) If p(x = 7) = 8 p (x = 9)

$\frac{e^{-m} \cdot m^7}{7!} = 8 \cdot \frac{e^{-m} \cdot m^9}{9!}$

$\frac{9!}{8 \times 7!} = \frac{m^9}{m^7}$

$\frac{9 \times 8 \times 7!}{8 \times 7!} = m^2$

$m^2 = 9$

m = 3

mean of Poisson distribution

= m = 3

102. The quartile deviation of a normal distribution with mean 10 and standard deviation 4 is _____. **Nov – 2020**

(a) 54.24 (b) 23.20 (c) 0.275 (d) 2.70

Answer:

(d) For Normal Distribution

Given Mean (μ) = 10

S.D. (σ) = 4

Quartile Deviation

Q.D. = 0.675 σ

= 0.675 × 4

= 2.70

103. If the parameter of Poisson distribution is m and (Mean + S. D.) = 6/25 the find m: **Nov – 2020**

(a) 3/25 (b) 1/25 (c) 4/25 (d) 3/5

Answer:

(b) In Poisson distribution

Mean = m

S.D. = $\sqrt{m}$

Given Mean + S.D. = $\frac{6}{25}$

m + $\sqrt{m}$ = $\frac{6}{25}$ _____(1)

By Hits and Trial

option (b) satisfied the eq. (1)

Here, m = $\frac{1}{25}$ putting in eq. (1)

L.H.S = $\frac{1}{25} + \sqrt{\frac{1}{25}} = \frac{1}{25} + \frac{1}{5} = \frac{6}{25}$ = R.H.S.

So, option (b) is correct.

104. A coin with probability for head as 1/5 is tossed 100 times. The standard deviation of the number of head turned up is . **Jan – 2021**

(a) 3 (b) 2 (c) 4 (d) 6

Answer:

(c) Here n = 100

Probability of success (p) = $\frac{1}{5}$

Probability of failure (q) = 1 – p

= 1 - $\frac{1}{5}$

= $\frac{4}{5}$

S.D. = $\sqrt{npq}$

= $\sqrt{100 \times \frac{1}{5} \times \frac{4}{5}}$

= $\sqrt{4 \times 4}$

= 4

105. If x is a Poisson variable and P (X = 1) = P (x = 2), then P (x = 4) is **Jan – 2021**

(a) $\frac{2}{3}e^{-2}$ (b) $\frac{2}{3}e^{4}$ (c) $\frac{3}{2}e^{-2}$ (d) $\frac{3}{2}e^{4}$

Answer:

(a) If X ~ P(m)

and P(x = 1) = P(x = 2)

$\frac{e^{-m} \cdot m^1}{1!} = \frac{e^{-m} \cdot m^2}{2!}$

$\frac{m}{1} = \frac{m^2}{2}$

2m = m^2

2 = m

m = 2

P(x = x) = $\frac{e^{-m} \cdot m^x}{x!}$

P(x = 4) = $\frac{e^{-2} \cdot 2^4}{4!}$

= $\frac{e^{-2} \cdot 16}{24}$

= $\frac{2e^{-2}}{3}$

106. Which one of the following is an uniparametric distribution? **Jan – 2021**

(a) Poisson (b) Normal (c) Binomial (d) Hyper geometric

107. For a normal distribution, the value of third moment about mean is. **Jan – 2021**

(a) 0 (b) 1 (c) 2 (d) 3

108. In normal distribution, Mean, Median and mode are: **July – 2021**

(a) Zero (b) Not Equal (c) Equal (d) Null

109. It is Poisson variate such that P(x = 1) = 0.7, P (x = 2) = 0.3, then P(x = 0) = **July – 2021**

(a) $e^{6/7}$ (b) $e^{-6/7}$ (c) $e^{-2/3}$ (d) $e^{-1/3}$

Answer:

(b) In a poisson variate

p(x = 1) = 0.7 and p(x = 2) = 0.3

$\frac{e^{-m} \cdot m^1}{1!} = 0.7$ $\frac{e^{-m} \cdot m^2}{2!} = 0.3$

$e^{-m} \cdot m = 0.7$ ____(1) $e^{-m} \cdot m^2 = 0.3 \times 2!$

$e^{-m} \cdot m^2 = 0.3 \times 2$

$e^{-m} \cdot m^2 = 0.6$ _____(2)

eq (1)/ eq (2)

$$\frac{\cancel{e^{-m}} \cdot m}{\cancel{e^{-m}} \cdot m^2} = \frac{0.7}{0.6}$$

$$\frac{1}{m} = \frac{7}{6}$$

m = 6/7

Now, $p(x=0) = \frac{e^{-m} \cdot m^0}{0!}$

$= \frac{e^{-6/7} \cdot 1}{1}$

$= e^{-6/7}$

110. Which of the following diagram is the most appropriate to represents various heads in total cost? **July – 2021**

(a) Pie chart (b) Bar graph (c) Multiple Line chart (d) Scatter plot

111. If x is a binomial variate with P =1/3, for the experiment of 90 trials, then the standard deviation is equal to: **July – 2021**

(a) $-\sqrt{5}$ (b) $\sqrt{5}$ (c) $2\sqrt{5}$ (d) $\sqrt{15}$

Answer:

(c) P if x ~ B (n,p)

Here n = 90 , p = 1/3 , q = 1 – p

$= 1 - \frac{1}{3}$

$= \frac{2}{3}$

S.D. $= \sqrt{npq}$

$= \sqrt{90 \times \frac{1}{3} \times \frac{2}{3}}$

$= \sqrt{20}$

S.D. $= 2\sqrt{5}$

112. For a certain type of mobile, the length of time between charges of the battery is normally distributed with a mean of 50 hours and a standard deviation of 15 hours. A person owns one of these mobiles and want to know the probability that the length of time will be between 50 and 70 hours is (given $\emptyset(1.33)) = 0.9082$, $\varphi(0) = 0.5$)? **July – 2021**

(a) - 0.4082 (b) 0.5 (c) 0.4082 (d) - 0.5

Answer:

(c) Here mean (μ) = 50 hours

S.D (σ) = 15 hours

$P(50 < x < 70) = P\left(\frac{50-50}{15} < \frac{x-\mu}{\sigma} < \frac{70-50}{15}\right)$

$= P(0 < \neq < 1.33)$

$= \varphi(1.33) - \varphi(0)$

$= 0.9082 - 0.5000$

$= 0.4082$

113. The average number of advertisements per page appearing in a newspaper is 3. What is the probability that in a particular page zero number of advertisements are there ? **Dec 2021**

(a) e^{-3} (b) e^{0} (c) e^{+3} (d) e^{-1}

Answer:

(a) Given m = 3; x=0

As per Poisson Distribution P(x) = $\frac{e^{-m}m^{x}}{X!}$

$P(X=0)=\frac{e^{-3}3^{0}}{0!}=e^{-3}$

114. Four unbiased coins are tossed simultaneously. The expected number of head is : **Dec 2021**

(a) 1 (b) 2 (c) 3 (d) 4

Answer:

(b) Since four coins are being tossed, we have n = 4.
Probability of getting a "heads" in each trial (p) = ½
Expected numbers of heads = np = 4 × ½ = 2.

115. If, for a Poisson distributed random variable X, the probability for X taking value 2 is 3 times the probability for X taking value 4, then the variance of X is **Dec 2021**

(a) 4 (b) 3 (c) 2 (d) 5

Answer:

(c) In Poisson Distribution, P(x) = $\frac{e^{-m}m^{x}}{x!}$

$$P(x=2)=3P(x=4)$$
$$\frac{e^{m}m^{2}}{2!}=3\times\frac{e^{-m}m^{4}}{4!}$$
$$\frac{1}{2}=\frac{3m^{2}}{24}$$
$$\frac{6m^{2}}{24}=1$$
$$m^{2}=\frac{24}{6}=4$$
$$m=\sqrt{4=2}$$

116. Let X be normal distribution with mean 2.5 and variance 1. If P [a < X < 2.5] = 0.4772 and that the cumulative normal probability value at 2 is 0.9772, then a = ? **Dec 2021**

(a) 0.5 (b) 3 (c) -3.5 (d) -4.5

117. The manufacturer of a certain electronic component is certain that 2 % in any box will be defective. Find the probability that a box, selected at random from 120 boxes would fail to meet the guarantee ? **Dec 2021**

(Given that $e^{-2.4}$ = 0.0907)

(a) 0.49 (b) 0.39 (c) 0.37 (d) 0.43

Answer:

(d) Here, n = 120 ; p= $\frac{2}{100}$ = 0.02

m = np = 120 × 0.02 = 2.40

As per Poisson Distribution, P(x) = $\frac{e^{-m}m^{x}}{X!}$

A box, selected at random would fail to meet the guarantee if more than 2.40 components turn out to be defective.

P(x >2.40) = 1 – P(x≤ 2.40)

P(x >2.40) = 1 – [P(x = 0) + P(x = 1) + P(x = 2)]

$$P(x>2.40)=1-\left[\frac{e^{-240}\cdot(2.40)^{0}}{0!}+\frac{e^{-240}\cdot(2.40)^{1}}{1!}+\frac{e^{-240}\cdot(2.40)^{2}}{2!}\right]$$

$$P(x>2.40)=1-\left[\frac{0.0907\times1}{1}+\frac{0.0907\times2.40}{1}+\frac{0.0907\times(2.40)^{2}}{2}\right]$$

P(x >2.40) ≈ 0.43

118. A renowned hospital usually admits 200 patients everyday. One percent patients on an average, require special room facilities. On one particular morning. It was found that only one

special room is available. What is the Probability that more than 3 patients would require special room facilities **Dec 2021**

(a) 0.1428 (b) 0.7132 (c) 0.2235 (d) 0.3450

Answer:

(a) Here n = 200; p = $\frac{1}{100}$

Therefore, m = np = 200 × $\frac{1}{100}$

As per Poisson Distribution, P(x) = $\frac{e^{-m}m^x}{X!}$

P(x >3) = 1 – P(x≤ 3)

P(x >3) = 1 – [P(x = 0) + P(x = 1) + P(x = 2)+P(x = 3)]

$P(x>3) = 1 - \left[\frac{e^{-2}\times 2^0}{0!} + \frac{e^{-2}\times 2^1}{1!} + \frac{e^{-2}\times 2^2}{2!} + \frac{e^{-2}\times 2^3}{3!}\right]$

$P(x>3) = 1 - \left[\frac{(271828)^{-2}\times 2^0}{0!} + \frac{(271828)^{-2}\times 2^1}{1!} + \frac{(271828)^{-2}\times 2^2}{2!} + \frac{(271828)^{-2}\times 2^3}{3!}\right]$

$P(x>3) = 1 - \left[\frac{1}{(2.71828)^2} + \frac{2}{(2.71828)^2} + \frac{4}{2\times(2.71828)^2} + \frac{8}{6\times(2.71828)^2}\right]$

$P(x>3) = 1 - \left[\frac{1}{(2.71828)^2}\left\{1 + 2 + \frac{4}{2} + \frac{8}{6}\right\}\right]$

P(x >3) = 1 – [0.8571] = 0.1428

119. If standard Deviation is 1.732 then what is the value of Poisson distribution. The P [- 2.48 < x < 3.54] is **June 2022**

(a) 0.73 (b) 0.65 (c) 0.86 (d) 0.81

Answer:

(b) Given S.D. = 1.723

S.D. = $\sqrt{3}$

In Poisson distribution

S.D. = $\sqrt{m}$

$\sqrt{3} = \sqrt{m}$

$\boxed{m = 3}$

P(-2.48 < n < 3.54)

= P(x = 0) + P(x = 1) + P(x = 2) + P(x = 3)

$= \frac{e^{-3}\times 3^0}{0!} + \frac{e^{-3}\times 3^1}{1!} + \frac{e^{-3}\times 3^2}{2!} + \frac{e^{-3}\times 3^3}{3!}$

$= e^{-3}\left[\frac{1}{0!} + \frac{3}{1!} + \frac{9}{2!} + \frac{27}{3!}\right]$

$= e^{-3}\left[1 + 3 + \frac{9}{2} + \frac{\cancel{27}^{9}}{\cancel{6}^{2}}\right]$

$= \frac{1}{e^3}$ [1+3+4.5+4.5]

$= \frac{1}{(2.72)^3} \times 13$

$= \frac{13}{(2.72)^3} = \frac{13}{20.12} = 0.6461 = 0.65$

120. In a normal distribution , variance is 16 then the value of mean deviation is. **June 2022**

(a) 4.2 (b) 3.2 (c) 4.5 (d) 2.5

Answer:

(b) Variance = 16 (In Normal Distribution)

S.D = $\sqrt{16}$ = 4

M.D = 0.8 S.D

= 0.8 × 4

= 3.2

121. For a binomial distribution, there may be – **June 2022**

(a) One mode (b) Two mode (c) Multi mode (d) No mode

122. Skewness of Normal Distribution is: **Dec 2022**

(a) Negative (b) Positive (c) Zero (d) Undefined

123. If a Poisson distribution is such that P(X = 2) = P(X = 3) then the variance of the distribution

is: **Dec 2022**

(a) $\sqrt{3}$ (b) 3 (c) 6 (d) 9

Answer:

(b) In Poisson distribution

$$P(x = 2) = P(x = 3)$$

$$\frac{e^{-m}m^2}{2!} = \frac{e^{-m}m^3}{3!}$$

$$\Rightarrow \frac{m^2}{2} = \frac{m^3}{6}$$

$$\Rightarrow 2m = 6$$

$$\Rightarrow m = 3$$

So Variance = m = 3

124. The Standard Deviation of Binomial distribution is: **Dec 2022**

(a) npq (b) $\sqrt{npq}$ (c) np (d) $\sqrt{np}$

125. The speeds of a number of bikes follow a normal distribution model with a mean of 83 km/hr and a standard deviation of 9.4 km./hr. Find the probability that a bike picked at random is travelling at more than 95 km/hr.? Given [P (Z > 1.28) = 0.1003] **Dec 2022**

(a) 0.1003 (b) 0.38 (c) 0.49 (d) 0.278

Answer:

(a) Mean (M) = 83 , S.D.(σ)= 9.4

$$P(x > 95) = P\left(\frac{x-M}{\sigma} > \frac{95-83}{9.4}\right)$$

$$= P(Z > 1.28)$$

$$= 0.1003$$

126. The incidence of skin diseases in a chemical plant occurs in such a way that its workers have 20% chance of suffering from it. What is the probability that 6 workers 4 or more will have skin diseases? **June 2023**

(a) 0.1696 (b) 0.01696 (c) 0.1643 (d) 0.01643

Answer :

(b) Probability of suffering of skin diseases (P) = 20%

$$P = 0.2$$

$$q = 1 - 0.2$$

$$q = 0.8$$

Here n = 6

$P(X=x) = {}^{n}c_{x} \cdot p^{x} \cdot q^{n-x}$

$P(X \geq 4) = P(X=4) + P(X=5) + P(X=6)$

$= {}^{6}C_4 \times (O.2)^4 (O.8)^{6-4} + {}^{6}C_5 \times (0.2)^5 (0.8)^{6-5} + {}^{6}C_6 \times (0.2)^6 (0.8)^{6-6}$

$P(X \geq 4) = 15 \times 0.0016 \times 0.64 + 6 \times 0.0032 \times 0.8 + 1 \times 0.000064 \times 1$

$= 0.01536 + 0.001536 + 0.000064$

$= 0.01696$

127. Between 9 and 10am the average number of phone calls per minutes coming into the switch board of a company is 4. Find the probability that during one particular minute. There will be either two phone calls or no phone calls. **June 2023**

(a) 0.156 (b) 0.165 (c) 0.149 (d) 0.194

Answer:

(b) Given Average phone calls (m) = 4

P(Either two calls or no phone calls)

$$= P(x = 2) + P(x = 0)$$

$$= \frac{e^{-m} \cdot m^2}{2!} + \frac{e^{-m} \cdot m^0}{0!}$$

$$= \frac{e^{-4} \cdot 4^2}{2!} + \frac{e^{-4} \cdot 4^0}{0!}$$

$$= e^{-4} \times 8 + e^{-4}$$

$= 9e^{-4}$

$= \frac{9}{e^4} = \frac{9}{(2.72)^2} = \frac{9}{54.74} = 0.165$

128. If a Poisson distribution is such that P (X =2) = $\frac{1}{3}$ P (x=3) **June 2023**

(a) 4 (b) 3 (c) 2 (d) 1

Answer:

(b) Given P(x = 2) P(x = 3) [x ~ P(m)]

$\frac{e^{-m} \cdot m^2}{2!} = \frac{e^{-m} \cdot m^3}{3!}$

$\frac{m^2}{2} = \frac{m^3}{6}$

2m = 6

M = 3

Mean of poisson distribution = m = 3

129. In a Standard Normal distribution, then the value of the mean (μ) and standard deviation (σ) is: **dec 2023**

(a) $\mu = 0$ and $\sigma = 0$ (b) $\mu = 0$ and $\sigma = 1$

(c) $\mu = 1$ and $\sigma = 0$ (d) $\mu = 0$ and $\sigma = 1$

Answer:

(b) In Standard Normal Distribution,

Mean (μ) = 0 and SD (σ) = 1

130. If mean and variance of a random variable which follows the Binomial Distribution are 7 and 6 respectively, then the probability of success is: **dec 2023**

(a) $\frac{6}{7}$ (b) $\frac{36}{49}$ (c) $\frac{1}{7}$ (d) $\frac{1}{49}$

Answer:

(c) In Binomial Distribution

Mean = 7 and Variance = 6

np = 7 — (1) npq = 6 — (2)

eq (2)/ eq (1)

$\frac{npq}{np} = \frac{6}{7}$

$q = \frac{6}{7}$

$P = 1 - q = 1 - \frac{6}{7} = \frac{1}{7}$

Probability of success $\boxed{P = \frac{1}{7}}$

131. If six coins are tossed simultaneously. The probability of obtaining exactly two heads are. **dec 2023**

(a) 0.2343 (b) 0.9841 (c) 0.1268 (d) 0.0156

Answer:

(a) Here n = 6, $p = \frac{1}{2}$, $q = \frac{1}{2}$

p(Exactly two heads obtained) = p(x = 2)

$= n_{cx} \cdot p^x \cdot q^{n-x}$

$= 6_{c2} \cdot \left(\frac{1}{2}\right)^2 \cdot \left(\frac{1}{2}\right)^{6-2}$

$= \frac{6 \times 5}{2 \times 1} \times \left(\frac{1}{2}\right)^{2+6-2}$

$= 15 \times \left(\frac{1}{2}\right)^6$

$= \frac{15}{64}$

$= 0.2343$

132. If 'x' and 'y' are independent normal variate with mean and Standard deviation respectively, then for z = x + y which also follows normal distribution mean and SD are: **dec**

2023

(a) Mean = $\mu_1 + \mu_2$, SD = $\sqrt{\sigma_1^2 + \sigma_2^2}$

(b) Mean = $(\mu_1 + \mu_2)/2$, SD = $\sqrt{\sigma_1^2 + \sigma_2^2}/2$

(c) Mean = $\mu_1 - \mu_2$, SD = $\sqrt{\sigma_1^2 - \sigma_2^2}$

(d) Mean = $(\mu_1 - \mu_2)/2$, SD = $\sqrt{\sigma_1^2 - \sigma_2^2}/2$

Answer:

(a) If X and Y are two independent of normal variate.

If X – N(μ_1, σ^2_1)

and Y – N(μ_2, σ^2_2)

then X + Y μ–N($\mu 1 + \mu_2, \sigma_1^2 + \sigma^2_2$)

Mean of (x+y) = ($\mu_1 + \mu_2$)

Variance of (x+y) = $\sigma_1^2 + \sigma^2_2$

S.D of (x+y) = $\sqrt{\sigma_1^2 + \sigma 2^2}$

133. For a binomial distribution the mean and standard deviation are 10 and 3 respectively. Find the value of n. **dec 2023**

(a) 30 (b) 9 (c) 90 (d) 100

Answer:

(d) For Binomial Distribution

Mean (μ) = np and S.D = 3

10 = np ……(1) $\sqrt{npq} = 3$

on squaring

npq = 9 …….(2)

eq. (2) / eq. (1)

$\frac{npq}{np} = \frac{9}{10}$

or q = $\frac{9}{10}$

p = 1 – q = 1 – $\frac{9}{10} = \frac{1}{10}$

putting the value of p in eq, (1)

10 = n × $\frac{1}{10}$

n= 100

Answer Key

1.	c	2.	b	3.	d	4.	b	5.	c	6.	d	7.	a	8.	c	9.	c	10.	a
11.	c	12.	a	13.	c	14.	d	15.	a	16.	c	17.	b	18.	d	19.	b	20.	c
21.	a	22.	a	23.	b	24.	d	25.	c	26.	a	27.	d	28.	d	29.	c	30.	c
31.	a	32.	a	33.	a	34.	a	35.	d	36.	a	37.	a	38.	b	39.	c	40.	a
41.	c	42.	a	43.	c	44.	d	45.	c	46.	b	47.	a	48.	b	49.	b	50.	d
51.	a	52.	a	53.	c	54.	a	55.	c	56.	a	57.	c	58.	c	59.	c	60.	c
61.	c	62.	a	63.	c	64.	c	65.	c	66.	c	67.	c	68.	c	69.	b	70.	c
71.	c	72.	c	73.	a	74.	c	75.	a	76.	b	77.	a	78.	c	79.	a	80.	d
81.	b	82.	c	83.	d	84.	c	85.	a	86.	c	87.	d	88.	b	89.	b	90.	a
91.	a	92.	b	93.	b	94.	c	95.	a	96.	a	97.	a	98.	b	99.	a	100.	b
101.	-	102.	d	103.	b	104.	c	105.	a	106.	a	107.	a	108.	c	109.	b	110.	a
111.	c	112.	c	113.	a	114.	b	115.	a	116.	a	117.	d	118.	a	119.	b	120.	b
121.	c	122.	c	123.	b	124.	b	125.	a										

CHAPTER
INDEX NUMBERS
PAST YEAR QUESTIONS

1. The number of test of Adequacy is : **Nov-2006**

(a) 2 (b) 3 (c) 4 . (d) 5

2. The consumer price index for 2006 on the basis of 2005 from the following data is : **Nov-2006**

Commodities	Quantities Consumed in 2005	Price in 2005	Prices in 2006
A	6	5.75	6.00
B	6	5.00	8.00
C	1	6.00	9.00
D	6	8.00	10.00
E	4	2.00	1.50
F	1	20.00	15.00

(a) 128.77 (b) 108.77 (c) 138.77 (d) 118.77

3. Suppose a business executive was earning ₹ 2,050 in the base period, what should be his salary in the current period if his standard of living is to remain the same? Given $\sum W = 25$ and $\sum IW = 3544$: **Nov-2006**

(a) ₹ 2096 (b) ₹ 2906 (c) ₹ 2106 (d) ₹ 2306

4. Fisher's ideal formula for calculating index number satisfies the_____ : **Feb-2007**

(a) Unit Test (b) Factor Reversal Test (c) Both (a) & (b) (d) None of these

5. Circular Test is satisfied by : **May-2007**

(a) Paasche's Index Number.

(b) The simple geometric mean of price relatives and the weighted aggregative with fixed weights

(c) Laspeyres Index Number

(d) None of these

6. From the following data **May-2007**

Group :	A	B	C	D	E	F
Group Index :	120	132	98	115	108	95
Weight :	6	3	4	2	1	4

The general index is given by :

(a) 113.54 (b) 115.30 (c) 117.92 (d) 111.30

7. Cost of living index numbers are also used to find real wages by the process of: **Aug-2007**

(a) Base shifting (b) Splicing of index numbers

(c) Deflating of index numbers (d) None of these

8. The prices of a commodity in the year 1975 and 1980 were 25 and 30 respectively. Taking 1980 as the base year the price relative is: **Aug-2007**

(a) 113.25 (b) 83.33 (c) 109.78 (d) None

9. P_{10} is the index for time: **Nov-2007**

(a) 0 on 1 (b) 1 on 0 (c) 1 on 1 (d) 0 on 0

10. Shifted Price index = $\frac{\text{Original Price index}}{\text{Price index of the year on which it has to be shifted}} \times 100$: **Feb-2008**

(a) True (b) False (c) Partly True (d) Partly False

11. Laspeyare's and Paasche's Method _____ Time Reversal Test : **June-2008**

(a) Do not satisfy (b) Satisfy (c) Depends on the case (d) Can't say.

12. Chain index is equal to : **June-2008**

(a) $\frac{\text{link relative of current year} \times \text{chain index of the curent year}}{100}$

(b) $\frac{\text{link relative of current year} \times \text{chain index of the previous year}}{100}$

(c) $\frac{\text{link relative of current year} \times \text{chain index of the current year}}{100}$

(d) None of these

13. In 2004 for working class people wheat was selling at an average price of ₹ 16 per 20 kg, cloth at ₹ 2 per meter, house rent ₹ 30 per house and other items at ₹ 10 per unit By 2005 cost of wheat rose by ₹ 4 per 20 Kg, house rent by ₹ 15 per house and other item doubled in price. The working class cost of living index for the year 2005 with 2004 as base) was 160. By how much did cloth rose in price during the period: June-2008

(a) 1.28 (b) 0.99 (c) 1.73 (d) 1.30

14. The ratio of price of the single commodity in a given period to its price in another period is called : **June-2008**

(a) Price Ratio (b) Price Relative (c) Base Period (d) None of these

15. Consumer Price Index Number goes up from 100 to 200 and salary of a worker is also raised from 300 to 500 **Dec-2008**

(a) 300 (b) 250 (c) 600 (d) 350

16. The Circular Test is known as : **Dec-2008**

(a) $P_{10} \times P_{12} \times P_{20} = 1$ (b) $P_{12} \times P_{01} \times P_{20} = 1$ (c) $P_{20} \times P_{12} \times P_{01} = 1$ (d) $P_{02} \times P_{21} \times P_{12} = 1$

17. Fisher'S Index is based on :- **June-2009**

(a) Arithmetic Mean of Laspeyre and Paasche (b) Geometric Mean of Laspeyre and Paasche
(c) Harmonic Mean of Laspeyre and Paasche (d) Median of Laspeyre and Paasche.

Answer:

(b) Fisher's ideal price index is the geometric mean of Laspeyres' Index and Paasche's Index .
Therefore ,

Fisher Index = $\sqrt{\text{Laspeyre} \times \text{Paasche}}$

$= \sqrt{\frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times \frac{\sum P_1 Q_1}{\sum P_0 Q_1}} \times 100$

18. In Passche's index, weights are based on: **June-2009**

(a) Current year quantities (b) Base year quantities
(b) Weighted average prices (d) None of these

Answer:

(a) In Paasche's Index , the quantity weights of the current year are Used . Therefore,

Paasche's Index = $\frac{\sum P_n Q_n}{\sum P_0 Q_n}$

19. Fisher's Ideal Index does not satisfy: **June-2009**

(a) Time Reversal Test (b) Factor Reversal Test
(c) Unit Test (d) Circular test

Answer :

(d) Time Reversal Test :

It is a test to determine wheter a given method will work both Ways in time, forward and backward .
Laspeyre's and Paasche's method do not satisfy this test , but Fisher Ideal Formula does .

Factor Reversal Test :

This holds when the product of price index and the quantity index Should be equal to the corresponding value index i.e. $\frac{\sum P_1 Q_1}{\sum P_0 Q_0}$

Symbolically : $P_{01} \times Q_{01} = V_{01}$

Only Fisher's Ideal satisfies Factor Reversal Test .

Unit Test –

This test requires that the formula should be independent of the unit in which or for prices and qualities are quoted .

Except for the simple (unweighted) aggregative index all other formulae satisfy this test . (This means that Fisher's Index also satisfies this test).

Circular Test –

It is concerned with the measurement of price changes over a period of years, when it is desirableto shift the base.

This test is **not met** by Laspeyres or Paasche's or the Fisher's Ideal Index.

The simple geometric mean of price relatives and the weighted aggregative with fixed weights meet this test .

Therefore, we can conclude that Fisher's Ideal Index satisfies all other tests except the Circular Test .

20. _____ $P_{01}Q_{01} = \frac{\Sigma P_1 Q_1}{\Sigma P_0 Q_0}$ which of following test satisfies the above? **June-2009**

(a) Time Reversal Test (b) Factor Reversal Test

(c) Circular Test (d) None of these.

Answer :

(b) Factor Reversal Test holds when the product of price index and the quantity index should be equal to the corresponding value index.

i.e. $\frac{\sum P_1 Q_1}{\sum P_0 Q_0}$

Symbolically : $P_{01} \times Q_{01} = V_{01}$

$$P_{01}\sqrt{\frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times \frac{\sum P_1 Q_1}{\sum P_0 Q_1}}\; Q_{01}\sqrt{\frac{\sum Q_1 P_0}{\sum Q_0 P_0} \times \frac{\sum P_1 Q_1}{\sum Q_0 P_1}}$$

$$P_{01} \times Q_{01} = \sqrt{\frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times \frac{\sum P_1 Q_1}{\sum P_0 Q_1} \times \frac{\sum Q_1 P_0}{\sum Q_0 P_0} \times \frac{\sum P_1 Q_1}{\sum P_0 Q_0}}$$

$$P_{01} \times Q_{01} = \sqrt{\frac{\sum P_1 Q_1}{\sum P_0 Q_0} \times \frac{\sum P_1 Q_1}{\sum P_0 Q_0}}$$

$$P_{01} \times Q_{01} = \frac{\sum P_1 Q_1}{\sum P_0 Q_0}$$

21. Time reversal & factor reversal are **Dec-2009**

(a) Quantity Index (b) Ideal Index (c) Price Index (d) Test of Consistency

22. In Laspeyeres Index Number _____ are used as weights? **Dec-2009**

(a) Base year price (b) Current year price

(c) Base year quantities (d) Current year quantities

23. In the data group Bowley's and Laspeyres index number is as follows. Bowley's index number = 150, Laspeyres index number = 180 then Paesche's index number is **June-2010**

(a) 120 (b) 30 (c) 165 (d) None of these

Answer :

(a) Drobish and Bowley Index No. = $\frac{\text{Laspeyres+Paasche's}}{2}$

$150 = \frac{180+\text{Paasche's}}{2}$

$180 + \text{Paasches} = 300$

$\therefore$ Paasche's Index No. = 120

24. Consumer price index is commonly known as **June-2010**

(a) Chain Based index (b) Ideal index

(c) Wholesale price index (d) Cost of living index.

25. If Laspeyres index number is 90 and Paasche's index number is 160, then Fisher's index number will **Dec-2010**

(a) 144 (b) 120 (c) 125 (d) None of these

Answer :

(b) Fisher's index No. = $\sqrt{\text{Laspeyre} \times \text{Paasche}}$

Fisher's index No. = $\sqrt{90 \times 160} = 120$

26. Wholesale Price Index (WP) is given by : **June-2011**

(a) Marshall-Edgeworth Index (b) Laspeyres Index

(c) Paasche's Index (d) None of the above.

27. Fisher's Ideal index is obtained by : **June-2011**

(a) Arithmetic Mean of Laspeyres & Paasche's index

(b) Geometric Mean of Laspeyres & Paasche's index

(c) Sum of Laspeyres & Paasche's index

(d) None of the above.

Answer :

(b) Fishers Ideal Index is obtained by geometric mean of Laspeyre's & Paasche's Price Index.

Fisher Ideal Index = $\sqrt{\text{LaspeyrePriceIndex} \times \text{PaaschePriceIndex}}$

28. The index number of prices at a place in the year 2008 is 225 with 2004 as the base year then **June-2011**

(a) average 125% increase in prices. (b) average 225% increase in prices.

(c) average 100% increase in prices. (d) None of the above.

Answer :

(a) Say , the price of base year 2004 = 100

∴ the price of current year 2008 = 225

Increase in Price = 225 – 100

=125

∴ % of incease in price = $\frac{Increaseinprice}{PriceofBaseyear} \times 100 = \frac{125}{100} \times 100 = 125\%$

29. If the price of all commodities in a place has increased 20% in Comparison to the base period prices, then the index number of prices for the place is now _____. **Dec-2011**

a) 100 b) 120 c) 20 d) 150

Answer :

(b) Price of Base yrs (P_0) = Rs. 100

Price of Current yrs (P_1) = Rs. 100 $+20\%\ Rs.100$

= Rs. 100 + Rs. 20 = Rs. 120

Index No. = $\frac{P_1}{P_0} \times 100 = \frac{120}{100} \times 100 = 120$

30. If $\Sigma P_0Q_0 = 116, \Sigma P_0Q_1 = 140\ \Sigma P_1Q_0 = 97, \Sigma P_1Q_1 = 117$ then Fisher's ideal index number is **June-2012**

(a) 184 (b) 83.59 (c) 119.66 (d) 120

Answer :

(b) Given : $\sum P_0Q_0 = 116$

$\sum P_0Q_1$ = 140

$\sum P_0Q_0$ = 97

$\sum P_1Q_1$ = 117

∵ Fisher's index formula

$= \sqrt{\frac{\sum P_1Q_0 \cdot \sum P_1Q_1}{\sum P_0Q_0 \cdot \sum P_0Q_1}} \times 100$

$= \sqrt{\frac{97 \times 117}{116 \times 140}} \times 100$

= 83.59

31. In year 2005 the wholesale price index number is 286 with 1995 as base year, then how much the prices have increased in 2005 in comparison to 1995? **June-2013**

a) 286% b) 386% c) 86% d) 186%

32. Circular test is satisfied by which index number? **June-2014**

a) Laspeyres b) Paasche's c) Fisher's d) None of the above

33. Factor reversal test is expressed in terms of **June-2015**

a) $\frac{\Sigma P_1 Q_1}{\Sigma P_0 Q_0}$ b) $\frac{\Sigma P_1 Q_1}{\Sigma P_0 Q_0} \times \frac{\Sigma P_1 Q_1}{\Sigma P_0 Q_1}$ c) $\frac{\Sigma P_1 Q_1}{\Sigma Q_0 P_1}$ d) $\frac{\Sigma Q_1 P_0}{\Sigma Q_0 P_0} \times \frac{\Sigma P_1 Q_1}{\Sigma Q_0 P_1}$

34. _____ play a very important role in the construction of index numbers. **June-2015**

a) Weights b) Classes c) Estimations d) None

35. If $\Sigma P_0 Q_0 = 1360, \Sigma P_n Q_0 = 1900, \Sigma P_0 Q_n = 1344, \Sigma P_n Q_n = 1880$, then the Laspeyre's Index Number is **June-2016**

a) 0.71 b) 1.39 c) 1.76 d) None.

Answer :

(b) $\sum P_0 Q_0 = 1360$, $\sum P_n Q_0 = 1900$

$\sum P_0 Q_n = 1344$, $\sum P_n Q_n = 1880$

Laspeyre's Index Number $= \frac{\sum P_n Q_0}{\sum P_0 Q_0}$

$= \frac{1900}{1360}$

$= 1.39$

36. In the year 2010 the monthly salary of a clerk was ₹ 24,000. The consumer price Index was 140 in the year 2010, which rises to 224 in the year 2016. If he has to be rightly compensated, what additional monthly salary to be paid to him? **June-2016**

a) ₹ 14,400 b) ₹ 38,400 c) ₹ 7,200 d) None of these.

Answer :

(a)

Years	Consumer Price	idex Salary
2010	140	24,000
2016	224	X

$\frac{140}{224} = \frac{24,000}{X}$

$X = \frac{24000 \times 224}{140}$

$X = 38,400$

D.A $= 38,400 - 24,000$

$= 14,400$

37. Index number are the_____ **Dec-2016**

(a) Economics (b) Statistics (c) (A) and (B) (d) None of these.

38. If Laspeyre's index no (L) and Paasche's index no (P) are known, then one can compute Fisher's index no (F) by: **June-2017**

a) F = LP b) $\sqrt{F}$ = LP c) F = 1/LP d) F^2 = LP

Answer :

(d) The relation between Laspeyre, Paasche & Fisher Index is given by

$F = \sqrt{L \times P}$ Where L –> Laspeyre Index

$\boxed{F^2 = L \times P}$ P–> Paasche Index

F –> Fisher Index

39. Circular test is an extension of _____: **Dec-2017**

(a) Factor reversal test (b) Time reversal test

(c) Neither (a) nor (b) (d) Both (a) and (b).

40. Price relative is equal to : **Dec-2017**

(a) $\frac{\text{Price in the given year}}{\text{Price in the base year}} \times 100$ (b) $\frac{\text{Price in the base year}}{\text{Price in the given year}} \times 100$

(c) Price in the given year × 100 (d) Price in the base year × 100

Answer :

(a) Price Relative $= \frac{Price\ of\ given (Current) year}{Price\ in\ the\ base\ year} \times 100$

41. For consumers price index, prices are collected from: **Dec-2017**

(a) Retail shop prices (b) Wholesale shop prices

(c) Fair prices shops (d) Government Depots.

42. A series of numerical figures which show the relative position is called. **May -2018**

(a) Index number (b) Relative number (c) Absolute number (d) None

43. Price relative is expressed in term of **May -2018**

(a) $P=\frac{P_o}{P_n}$ (b) $P=\frac{P_o}{P_n}$ (c) $P=\frac{P_n}{P_o}\times 100$ (d) $P=\frac{P_o}{P_n}\times 100$

44. If Laspeyre's Index Number is 250 and Paasche's Index Number is 160, then Fisher's Index Number is **Nov-2018**

a) 40,000 b) $\frac{25}{16}$ c) 200 d) $\frac{16}{25}$

Answer:

(c) Given: Laspeyre Index No. (L) = 250
Paasche Index No. (P) = 160
Fisher Index No. (F) = $\sqrt{L\times P}$
= $\sqrt{250\times 160}$
= $\sqrt{40{,}000}$
= 200

45. The cost of living index numbers in years 2015 and 2018 were 97.5 and 115 respectively. The salary of a worker in 2015 was ₹19500. How much additional salary was required for him in 2018 to maintain the some standard of living as in 2015? **June-2019**

(a) 3000 (b) 4000 (c) 3500 (d) 4500

Answer:

(c) When index was 97.5, the salary Rs. 19,500
Now, when the index is 115, the salary should be
$\frac{115\times 19.500}{97.5}$ = Rs. 23,000
Therefore, additional salary required
= Rs. 23,000 – Rs. 19,500 = Rs. 3,500

46. Fisher's index number does not satisfy: **Nov-2019**

(a) Circular test (b) Time reversal test (c) Factor reversal test (d) Unit test

Answer:

(a) Fisher's ideal formula for calculating index no satisfies unit test as unit test requires that the formula should be independent of the unit in which or for which prices and quantities are quoted and that is fulfilled by fisher's Ideal Index,

Factor reversal test holds when the Product of price index and Quantity index should be equal to corresponding value index i.e.

$= \frac{\sum P_1Q_1}{\sum P_0Q_0}$

$P_{01}\times Q_{01} = \frac{\sum P_1Q_1}{\sum P_0Q_0}$

Hence it is satisfied by Fisher's ideal index.

Time reversal test is a test to determine whether a given method will work both ways in time forward and backward. So Fisher's satisfies this test.

Circular Test it is concerned with the measurement of price change over a period of years. This is not met by Fisher's ideal index no.

47. The index number of prices at place in the year 2008 is 225 with 2004 as the base then there is: **Nov-2019**

(a) 125% increase (b) 225% increase (c) 100% increase (d) 25% decrease

Answer:

(a) Let the index number of the base year be 100.
Now,

Year	Index Number
2004	100
2008	225

Therefore, increase = 225 – 100 = 125

% increase = $\frac{125}{100} \times 100 = 125\%$

48. Fisher's ideal Index Number does not satisfy _____ test **Nov – 2020**

(a) Circular (b) Time reversal (c) Factor Reversal (d) Unit

49. Index Numbers are expressed as **Nov – 2020**

(a) Squares (b) Ratio (c) Percentages (d) Combinations

50. In Laspeyre's Index number is 110 and Fisher's ideal index number is 109. Then Paasche's index number is **Nov – 2020**

(a) 118 (b) 110 (c) 109 (d) 108

Answer:

(d) Laspeyer Index No. (L) = 110

Fisher's Index No. (F) = 109

Paasche Index No. P = ?

$F^2 = L \times P$

$P = \frac{F^2}{L} = \frac{(109)^2}{110}$

$= \frac{109 \times 109}{110}$

$P = 108.$

51. The cost of living index is always **Jan – 2021**

(a) Price index number (b) Quantity index number

(c) Weighted index number (d) Value index number

52. Fisher's index number does not satisfy **Jan – 2021**

(a) Unit test (b) Circular test (c) Time reversal test (d) Factor reversal test

53. When the prices or quantities consumed of all commodities are changing in the same ratio, then the index numbers due to Laspeyre's and Paasche;s will be **Jan – 2021**

(a) Equal

(b) Unequal

(c) Reciprocal of Marshall Edge worth Index Number

(d) Reciprocal of Fisher Index Number

54. The consumer price index goes up from 120 to 180 when salary goes up from 240 to 540, what is the increase in real terms? **July – 2021**

(a) 80 (b) 150 (c) 100 (d) 240

55. The weighted aggregative price index turnover for 2001 with 2000 as the base year using fisher's Index Number is: **July – 2021**

(a) 12.26 (b) 112.20 (c) 112.32 (d) 112.36

56. The weighted aggregative price index numbers for 2001with 2000 as the base year using Paasche's index number is: **July – 2021**

Commodity	Price (in ₹)		Quantities	
	2000	2001	2000	2001
A	10	12	20	22
B	8	8	16	18
C	5	6	10	11
D	4	4	7	8

(a) 112.32 (b) 112.38 (c) 112.26 (d) 112.20

Answer:

(d)

Commodity	2000		2001			
	Price P_0	Qty. Q_0	Price P_1	Qty Q_1	P_0Q_1	P_1Q_1

A B C D	10 8 5 4	20 16 10 7	12 8 6 4	22 18 11 8	220 144 55 32	264 144 66 32
					$\sum P_0Q_1$ =451	$\sum P_1Q_1$ =506

Paasche Index No = $\frac{\sum P_1Q_1}{\sum P_0Q_1} \times 100$

$= \frac{506}{451} \times 100$

= 112.20 (Approx)

57. The weighted aggregative price index numbers for 2001 with 2000 as the base year using Marshall Edgeworth index number is: **July – 2021**

Commodity	Price (in ₹)		Quantities	
	2000	2001	2000	2001
A	10	12	20	22
B	8	8	16	18
C	5	6	10	11
D	4	4	7	8

(a) 112.26 (b) 112.20 (c) 112.32 (d) 112.38

Answer:

(a)

Commodity	2000	2001						
	Price	Qty	Price	Qty	P_0Q_0	P_0Q_1	P_1Q_0	P_1Q_1
	P_0	Q_0	P_1	Q_1				
A	10	20	12	22	200	220	240	264
B	8	16	8	18	128	144	128	144
C	5	10	6	11	50	55	60	66
D	4	7	4	8	28	32	28	32
					$\sum P_0Q_0$ = 406	$\sum P_0Q_1$ =451	$\sum P_1Q_0$ =456	$\sum P_1Q_1$ = 506

M.E Index No. = $\left(\frac{\sum P_1Q_0 + \sum P_1Q_1}{\sum P_0Q_0 + \sum P_0Q_1}\right) \times 100$

$= \left(\frac{456+506}{406+451}\right) \times 100$

=112.26

58. If P_{10} and P_{01} are index for 1 on 0 and 0 on 1 respectively then formula $P_{01} \times P_{10} = 1$ is used for **Dec 2021**

(a) Unit test (b) Time Reversal Test

(c) Factor Reversal Test (d) Circular Test

Answer:

(b) $P_{01} \times P_{10} = 1$ is used for 'Time Reversal Test'.

59. The weighted average of price relatives of commodities, when the weights are equal to the value of commodities in the current year, yields _____index number **Dec 2021**

(a) Fisher's ideal (b) Laspeyres's

(c) Paasches' (d) Marshall – Edgeworth

60. From the following data base year: **Dec 2021**

Commodity		Base year		Current year
	Price	Quantity	Price	Quantity
A	4	3	6	2
B	5	4	6	4
C	7	2	9	2

D	2	3	1	5

Fisher's Ideal Index is

(a) 117.30 (b) 115.43 (c) 118.35 (d) 116.48

Answer:

(a) Fisher's Index

$$= \sqrt{\frac{\sum P_n Q_0}{\sum P_0 Q_0} \times \frac{\sum P_n Q_n}{\sum P_0 Q_n}} \times 100$$

$$= \sqrt{\frac{(6\times3)+(6\times4)+(9\times2)+(1\times3)}{(4\times3)+(5\times4)+(7\times2)+(2\times3)} \times \frac{(6\times2)+(6\times4)}{(4\times2)+(5\times4)}}$$

$$= \sqrt{\frac{63}{52} \times \frac{59}{52}} \times 100 = 117.3$$

61. Index Numbers are not helpful in **Dec 2021**

(a) Framing economics policies (b) Revealing trend

(c) Forecasting (d) Identifying errors

62. The three index numbers, namely, Laspeyre, Paasche and fisher do not satisfy _____test. **Dec 2021**

(a) Time reversal (b) Factor reversal (c) Unit (d) Circular

63. 7, 26, 63, 124, 215, 342 _____ ? **June 2022**

(a) 511 (b) 672 (c) 508 (d) 556

64. LOTUS is coded as 14682 and STRANGE is coded as 2690753. How will you code GESTURE **June 2022**

(a) 5236893 (b) 5326793 (c) 5346893 (d) 5326893

65. 4, 6, 9, 13, 5, _____, 30.375 **June 2022**

(a) 40.50 (b) 20.25 (c) 40.75 (d) 60.25

66. Code for Word EARTH is 16235 and VENUS is 91784 what is code for SATURN? **June 2022**

(a) 423827 (b) 463827 (c) 463877 (d) 413827

67. Find out the next term – **June 2022**

7, 11, 27, 63, 127, _____

(a) 511 (b) 227 (c) 5100 (d) 255

68. Find the next terms – **June 2022**

3, 7, 15, 31, ?, 127

(a) 62 (b) 63 (c) 64 (d) 65

69. Find out the next term – **June 2022**

6, 13, 28, 59, ?

(a) 122 (b) 114 (c) 113 (d) 112

70. Geometric mean method used in which index to find it out **June 2022**

(a) Laspeyres (b) Paasches

(c) Fishers index Number (d) None

71. Which test is known for shift base index no. **June 2022**

(a) Factor test (b) Unit test (c) Circular test (d) Time reveral test

72. Laspeyre and Paasche do not satisfy – **June 2022**

(a) Unit Test (b) Factor test (c) Time Reversal Test (d) Bowley's Test

73. Laspeyer's index number is based on? **June 2022**

(a) Last year weight (b) Present year weight (c) Last year value (d) Present year Value

74. Which one of the following is not appropriate for calculation of index number? **June 2022**

(a) Unit Test (b) Price Relative Test (c) Circular Test (d) time Reversal Test

75. If 'FROZEN' is decoded as OFAPSG'. TICK the right option that depicts 'MOLTEN' written in this way **Dec 2022**

(a) OFPOMN (b) OFSMPN (c) OFUMPN (d) OFUNPN

76. Find the odd man out: **Dec 2022**

34, 105, 424, 2123, 12756.

(a) 12756 (b) 2123 (c) 424 (d) 34

77. Find the missing number in the following series? **Dec 2022**

3, 5, 5, 19, 7, 41, 9, ?, 11, 109

(a) 71 (b) 61 (c) 69 (d) 79

78. In certain code language, if TOUR, is written as 1234, CLEAR is written And SPARE is written as 90847, find the code for CARE? **Dec 2022**

(a) 1247 (b) 4847 (c) 5247 (d) 5847

79. Find the next number in the given sequence? **Dec 2022**

11, 17, 39, 85, ?, 281, 447

(a) 133 (b) 143 (c) 153 (d) 163

80. IF ROSE 'is coded as 6821 , CHAIR is coded as 73456 and PREACH is coded as 961473, what will be the code for SEARCH? **Dec 2022**

(a) 246173 (b) 214673 (c) 216473 (d) 214763

81. From the following data construct the index number by Laspeyre's method $P_1Q_1 = 99$, $P_0Q_1 = 76$, $P_0Q_0 = 73$, $P_1Q_0 = 96$ **Dec 2022**

(a) 130.36 (b) 131.51 (c) 130.59 (d) 76.01

Answer:

(b) Here $\sum P_1Q_1 = 99$, $\sum P_0Q_1 = 76$

$\sum P_0Q_0 = 73$, $\sum P_1Q_0 = 96$

Laspeyre Index No. $= \frac{\sum P_1Q_0}{\sum P_0Q_0} \times 100$

$= \frac{96}{73} \times 100$

$= 131.51$

82. Which of the following index measures the change from month to month in the cost of a representative basket of goods and services of the type which are bought by a typical household? **Dec 2022**

(a) Retail Price Index (b) Laspeyre's Index (c) Fisher's Index (d) Paasche's Index

83. Fisher's Index number is called as ideal index number because it is satisfying. **Dec 2022**

(a) Factor reversal test (b) Time reversal test

(c) Both factor and time reversal test (d) Circular test

84. If Laspeyre's Index is 119 and Passche's Index is 112. Then Fisher's index number will be: **Dec 2022**

(a) 113.99 (b) 115.45 (c) 115.89 (d) 151.98

Answer :

(b) Laspeyre's Index No.(L) = 119

Paasche's Index No. (P) = 112

Fisher Index No. (F) = ?

We know that $F = \sqrt{L \times P}$

$= \sqrt{119 \times 112}$

$= \sqrt{13328}$

$= 115.45$

85. In price index, when a new commodity is required to be added , which of the following index is used? **Dec 2022**

(a) Shifted price index (b) Splicing price index

(c) Deflating price index (d) Value price index

86. Consider the data

Year	Base Year		Current Year	
	Price	Quantity	Price	Quantity
A	10	5	20	2
B	15	4	25	8
C	40	2	60	6
D	25	3	40	4

Laspeyre's index is . **June 2023**

(a) 166.04 (b) 156.04 (c) 164.06 (d) 154.06

Answer:

(a) Sol.

Years	Base year			Current years		
	Price (p_0)	Quantity q_0	Price p_1	Quantity (q_1)	p_0q_0	p_1q_0
A	10	5	20	2	50	100
B	15	4	25	8	60	100
C	40	2	60	6	80	120
D	25	3	40	4	75	120
					p_0q_0 =265	p_1q_0 =440

Laspeyre's Index No. $= \frac{\sum p_1q_0}{\sum p_0q_0} \times 100$

$= \frac{440}{265} \times 100$

$= 166.04\ \%$

87. Which of the following index is computed taking the average of base year and current year ? **June 2023**

(a) Marshall-Edgeworth's index (b) Paasche's index

(c) Laspeyre's index (d) Fisher's index

Answer:

(a) Marshall – Edgeworth's Index is computed taking the Average of base year and current year.

88. The index number of prices for a country at a given date in 250. In comparison to the base period price the price of all commodities in the country has increase by _____ times. **June 2023**

(a) 1.25 (b) 1.5 (c) 2 (d) 2.5

Answer:

(b) The Index No. of prices for a country at a given date = 250

Here Current price = 250

Base price = 100

Price Increased = 250 – 100 = 150

$= 1.5 \times 100$

= 1.5 times of Base Price

89. If Fisher's index number is 160 and Paasche's index number is 140 laspeyre's index 40 is : **June 2023**

(a) 187.77 (b) 182.86 (c) 183.25 (d) 186.25

Answer:

(b) Given Fisher's Index No. (F) = 160

Paashe' index No. (P) = 140

Laspere index No. = ?

$F = \sqrt{L \times P}$

$F^2 = L \times P$

$L = \frac{F^2}{P} = \frac{(160)^2}{140} = \frac{160 \times 160}{140} = 182.86$

90. Weighted guarantee means of relative formula satisfies _____ test while as factor reversal test is satisfied be _____ . **June 2023**

(a) Time reversal Firher's ideal index (b) Time reversal Laspeyre' index

(c) Factor reversal Paasche's index 0 (d) Factor reversal Firsher's ideal index

Answer:

(a) Time reversal fisher's ideal index.

91. The gross monthly pay of an employee was ₹ 15,000 in a year 2020.The consumer price index number in 2023 is 155 with 2020 as base year. If employee is to rightly compensate what dearness allowance is required to be paid ? **dec 2023**

(a)₹ 8,000 (b)₹ 8,250 (c)₹ 8,500 (d)₹ 8,750

Answer:

(b)

Year	C.P.I	Monthly
2020	100	15000
2023	155	×

$$\frac{100}{155} = \frac{15000}{x}$$

$$x = \frac{15000 \times 155}{100}$$

$$= 23250$$

D.A. = 23250 – 15000 = Rs. 8250

92. An Index number constructed to measure the relative change in the price of an item or a group of item is called: **dec 2023**

(a) Quantity index number (b) Price index number

(c) Volume index number (d) Composite index number

Answer:

(b) An index Number constructed to Measure the relative change in the price of an item or a group of item is called Price Index No.

93. Fisher's index does not satisfy following test. **dec 2023**

(a) Unit test (b) Time Reversal Test

(c) Circular Test (d) Factor Reversal Test

Answer:

(c) Fisher's Index No. does not satisfied circular test.

94. If the Laspeyre's index is 110 and Passche's index is 108,then what is the value of Fisher's index ? **dec 2023**

(a) 106.50 (b) 107.60 (c) 108.99 (d) 109.88

Answer:

(c) Given, Laspeyre Index (L) = 110

Paasche Index (P) = 108

Then Fisher Index to = $\sqrt{L \times P)}$

$= \sqrt{110 \times 108}$

= 108.99

95. From the year 2013 to 2023, Consumer price index number is increased from 135 to 180. During this period, salary of the employees as per pay commission recommendations was revised from ₹ 23,000 to 29,500.In real terms, an employee should get following additional amount (upto nearest whole number) to maintain his previous standard of living. **dec 2023**

(a) ₹ 1,167 (b) ₹ 666 (c) ₹ 909 (d) ₹ 6,500

Answer:

(a)

Year	_ C.P.Z	Salary
2013	135	23,000
2023	180	x

$$\frac{135}{180} = \frac{23,000}{x}$$

$$x = \frac{180}{135} \times 23,000$$

x = 30,667

Addition Salary should be = 30,667 – 29,500

= 1167 approx.

Answer Key																			
1.	c	2.	d	3.	b	4.	c	5.	b	6.	d	7.	c	8.	b	9.	a	10.	a
11.	a	12.	b	13.	d	14.	b	15.	b	16.	b	17.	b	18.	a	19.	d	20.	b
21.	d	22.	c	23.	a	24.	d	25.	b	26.	b	27.	b	28.	a	29.	b	30.	b
31.	d	32.	d	33.	a	34.	a	35.	b	36.	a	37.	c	38.	d	39.	b	40.	a
41.	a	42.	a	43.	c	44.	c	45.	c	46.	a	47.	a	48.	a	49.	c	50.	d
51.	a	52.	b	53.	a	54.	c	55.	d	56.	d	57.	a	58.	b	59.	c	60.	a
61.	d	62.	d	63.	a	64.	d	65.	b	66.	b	67.	b	68.	b	69.	a	70.	c
71.	c	72.	c	73.	a	74.	b	75.	c	76.	b	77.	a	78.	d	79.	d	80.	b
81.	b	82.	a	83.	c	84.	b	85.	a										