

**PAPER 3 : QUANTITATIVE APTITUDE**

1. Ans. c

Explanation:

Region represented by the line  $3x + 2y = 24$  meets the coordinate axes at (8,0) and (0,12). Since the shaded region lies below the line  $3x+2y=24$  therefore it is represented by less than or equal to sign i.e.  $3x+2y \leq 24$ .

Similarly for the line  $x+2y = 16$  the shaded region lies below the line therefore it is represented by less than or equal to sign i.e.  $x+2y \leq 16$

Clearly  $X \geq 0$  and  $y \geq 0$  represents the region lying on the right side of y axis and above x axes.

2. Ans. d

Explanation:

$$a^x = b^y = c^z = k$$

$$a = k^{1/x}, b = k^{1/y}, c = k^{1/z}$$

$$\therefore b^2 = ac$$

$$k^{2/y} = k^{1/x} \cdot k^{1/z}$$

$$\frac{2}{y} = \frac{1}{x} + \frac{1}{z}$$

$$y = \frac{2xz}{x+z}$$

3. Ans. c

Explanation

Let one root is  $\alpha$  then other root is  $-\alpha$

Sum of root  $\alpha - \alpha = -2m$  [Sum of roots =  $-b/a$ ]

$$\boxed{m=0}$$

4. Ans. d

Explanation:

Let  $\alpha$  and  $\beta$  are roots of equation

$$\begin{aligned} \alpha^2 + \beta^2 &= (\alpha + \beta)^2 - 2\alpha\beta \\ &= (-2)^2 - 2(-143) \\ &= 290 \end{aligned}$$

5. Ans. a

Explanation:

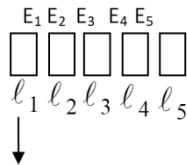
$$\frac{A}{B} = \frac{2}{3}, \frac{B}{C} = \frac{1}{4}$$

$$A:B:C = 2:3:12$$

$$A's \text{ share} = Rs. 510 \times \frac{2}{17} = Rs. 60$$

6. Ans. b

Explanation:



$$5 \times 4 \times 3 \times 2 \times 1$$

Total ways = 120

There is only 1 way to put all in directed envelopes.

So Remaining = 120 - 1 = Rs. 119

7. Ans. d

Explanation:

$$r = -3$$

$$S_{\infty} = \frac{a}{1-r}, -1 < r < 1$$

8. Ans. d

Explanation:

$$\begin{aligned} \text{Given } T_n &= 2n-1 \\ S_n &= \sum (2n-1) \\ &= 2 \sum n - n \\ &= 2 \cdot \frac{n(n+1)}{2} - n = n^2 \end{aligned}$$

9. Ans. c

Explanation:

Sum of natural numbers till 300

$$S_{300} = \frac{300(300+1)}{2} = 45150 \quad \left[ \sum n = \frac{n(n+1)}{2} \right]$$

Natural numbers which are divisible by 3

3 + 6 + 9 + 12 + ..... 300

$$n = \frac{300-3}{3} + 1 \quad [T_n = a + (n-1)d]$$

$$= 100$$

$$S_n = \frac{n}{2}(a+L) \quad a = 3$$

$$L = 300$$

$$n = 100$$

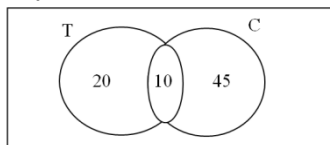
$$= \frac{100}{2} [300+3] = 15150$$

So sum of the numbers which are not divisible by 3 is  $S_{300} - S_n$

$$= 45150 - 15150 = \boxed{30000}$$

10. Ans. a

Explanation:



∴ 45 persons take coffee but not tea.

11. Ans. b

Explanation:

$$nC_2 = 153$$

$$\frac{n(n-1)}{2} = 153$$

$$n = 18$$

12. Ans. a

Explanation:

$$g \circ f(x) = g(f(x))$$

$$= g(x+1)$$

$$= 3(x+1)^2 - 2$$

$$= 3(x^2 + 2x + 1) - 2$$

$$= 3x^2 + 6x + 3 - 2$$

$$= 3x^2 + 6x + 1$$

13. Ans. c

Explanation:

$$(n-2) \times (n-1)!$$

$$= 8 \times 9!$$

14. Ans. a

Explanation:

$$7 \times 7 = 49$$

15. Ans. c

Explanation:

$$3! \times 2! = 6 \times 2 = 12$$

16. Ans. a

Explanation:

$$\frac{dy}{dx} = 6x^2 - 6x - 12$$

$$\frac{dy}{dx} \text{ at } x=0 = -12$$

17. Ans. a

Explanation:

$$\int (x^3 + 3^x) dx \quad \left[ e^{\log x} = x \right]$$

$$\frac{1}{4}x^4 + \frac{3^x}{\log 3} + c$$

18. Ans. d

Explanation:

$$A = \frac{R}{r} [(1+r)^n - 1]$$

$$796870 = \frac{R}{0.1} [(1+0.1)^{10} - 1]$$

$$R = 50,000$$

19. Ans. b

Explanation:

R is reflexive and symmetric but not transitive, since  $(1,2) \in R$  and  $(2,3) \in R$  but  $(1,3)$  does not belong to R.

20. Ans. c

Explanation:

$$\frac{3x-4}{2} \geq \frac{x+1-4}{4}$$

$$12x-16 \geq 2x-6$$

$$10x \geq 10$$

$$x \geq 1$$

21. Ans. c

Explanation:

$$A \times B = \{ (2,4), (2,5), (3,4), (3,5) \}$$

$$B \times C = \{ (4,5), (4,6), (5,5), (5,6) \}$$

$$(A \times B) \cup (B \times C) = \{ (2,4), (2,5), (3,4), (3,5), (4,5), (4,6), (5,5), (5,6) \}$$

22. Ans. a

Explanation:

$$\log_t^a + \log_t^b + \log_t^c = \log_t^z$$

$$\log_t^{(abc)} = \log_t^z$$

$$Z = abc$$

23. Ans. b

Explanation:

$$\log_{10} 80 = \log_{10} (8 \times 10)$$

$$= \log_{10} (2 \times 4 \times 10)$$

$$= \log_{10} 2 + \log_{10} 4 + \log_{10} 10$$

$$= x + y + 1$$

24. Ans. c

Explanation:

$$\begin{aligned} f(x) &= {}^x C_2 \\ &= \frac{x(x-1)}{2} \\ &= \frac{x^2 - x}{2} \\ f'(x) &= \frac{2x-1}{2} \\ f'(3) &= \frac{2 \times 3 - 1}{2} = \frac{5}{2} \end{aligned}$$

25. Ans. d

Explanation:

$$\begin{aligned} \lim_{x \rightarrow c} \frac{3}{2} (x+2)^{1/2} \\ &= \frac{3}{2} (c+2)^{1/2} \end{aligned}$$

26. Ans. b

Explanation:

$$\begin{aligned} \lim_{x \rightarrow 1} -e^{-x} \\ &= \frac{-1}{e} \end{aligned}$$

27. Ans. a

Explanation:

$$\begin{aligned} x^3 - 3x^2 - 4x + 12 &= 0 \\ x^2(x-3) - 4(x-3) &= 0 \\ (x-3)(x^2-4) &= 0 \\ x &= 2, -2, 3 \end{aligned}$$

28. Ans. b

Explanation:

$$\begin{aligned} x + y &= 75 \\ x - y &= 25 \\ \text{On solving } x &= 50 \text{ and } y = 25 \\ \text{Product of the two numbers} &= 50 \times 25 \\ &= 1250 \end{aligned}$$

## Mittal Commerce Classes

29. Ans. a

Explanation:

$$\begin{aligned}\text{By option mean proportion} &= \sqrt{4 \times 9} \\ &= 6\end{aligned}$$

$$\begin{aligned}\text{Third proportion} &= \frac{9^2}{4} = \frac{81}{4} \\ &= 20.25\end{aligned}$$

30. Ans. d

Explanation:

$$\begin{aligned}A &= P \left( 1 + \frac{rt}{100} \right) \\ 840 &= 750 \left( 1 + \frac{4 \times t}{100} \right) \\ t &= 3\text{yrs}\end{aligned}$$

$$\begin{aligned}575 &= P \left( 1 + \frac{5 \times 3}{100} \right) \\ P &= 500\end{aligned}$$

31. Ans. b

Explanation:

$$\begin{aligned}x^2 - 5x + 6 &= 0 \\ x &= 2, 3 \\ SI &= \frac{2000 \times 2 \times 3}{100} \\ &= 120\end{aligned}$$

32. Ans. c

Explanation:

$$\begin{aligned}\frac{1500 \times 3r_1}{100} - \frac{1500 \times 3r_2}{100} &= 9 \\ 45(r_1 - r_2) &= 9 \\ r_1 - r_2 &= 0.20\end{aligned}$$

33. Ans. b

Explanation:

$$\begin{aligned}A &= P \left( 1 + \frac{r}{100} \right)^n \\ 60,000 &= 40,000 \left( 1 + \frac{r}{100} \right)^2 \\ r &= 22.47 \%\end{aligned}$$

34. Ans. d

Explanation:

$$\begin{aligned}E &= [(1 + i)^n - 1] \times 100 \\ &= \left[ \left( 1 + \frac{6}{400} \right)^4 - 1 \right] \times 100 \\ &= 6.13\%\end{aligned}$$

35. Ans. b

Explanation:

## Mittal Commerce Classes

$$A = P \left( 1 + \frac{r}{100} \right)^n$$

$$A = 1,20,000 \left( 1 + \frac{5}{100} \right)^2$$

$$= 1,32,300$$

36. Ans. c

Explanation:

$$A = P \left( 1 + \frac{r}{100} \right)^n$$

$$2P = P \left( 1 + \frac{r}{100} \right)^4$$

$$2 = \left( 1 + \frac{r}{100} \right)^4$$

$$64P = P \left( 1 + \frac{r}{100} \right)^n$$

Put the value of 2

$$2^6 = \left( 1 + \frac{r}{100} \right)^n$$

$$\left( 1 + \frac{r}{100} \right)^{24} = \left( 1 + \frac{r}{100} \right)^n$$

$$n = 24 \text{ years}$$

37. Ans. a

Explanation:

Given  $A_3 = 400$ ,  $A_6 = 500$

Now  $\frac{P(1+i)^6}{P(1+i)^3} = \frac{500}{400}$

$$(1+i)^3 = 1.25$$

Now  $A_3 = P(1+i)^3 = 400$

$$P \times 1.25 = 400$$

$$P = 320$$

38. Ans. b

Explanation:

$$F.V. = P(1+i)^n$$

$$= 4000(1+0.04)^4$$

$$= 4679$$

39. Ans. c

Explanation:

PV of Annuity regular = 30,000

$$\frac{A}{i} [1 - (1+i)^{-n}] = 30,000$$

$$\frac{A}{.14} [1 - (1+.14)^{-5}] = 30,000$$

$$A = 8738$$

40. Ans. d

Explanation:

$$A(n, i) = \frac{A}{i} [(1+i)^n - 1]$$

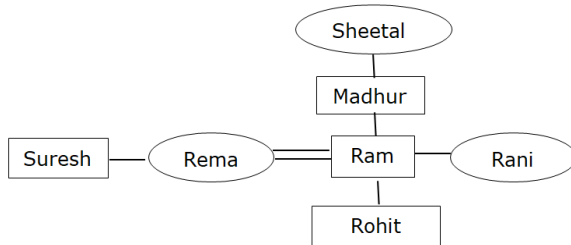
$$= \frac{800}{0.005} [(1+.005)^{10} - 1]$$

$$= \frac{800}{0.005} [1.0511 - 1]$$

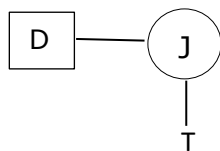
$$= 8176$$

## Mittal Commerce Classes

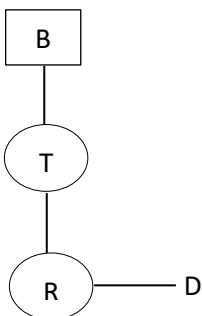
41. Ans. d  
 Explanation:



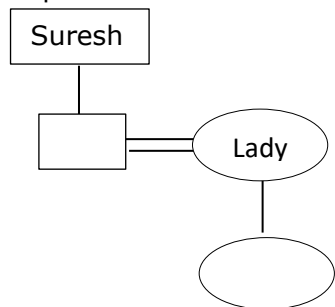
42. Ans. a  
 Explanation:



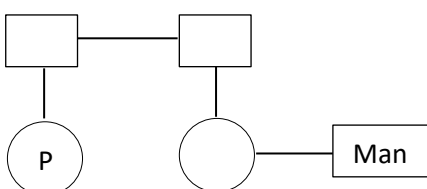
43. Ans. c  
 Explanation:



44. Ans. d  
 Explanation:



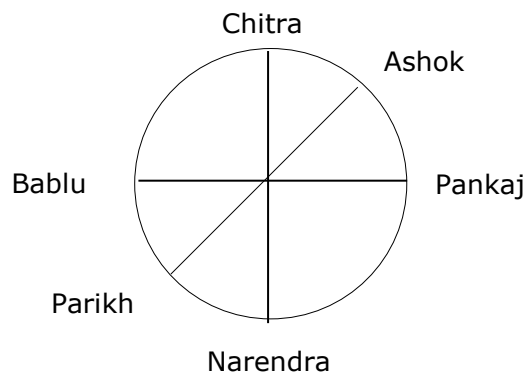
45. Ans. b  
 Explanation:



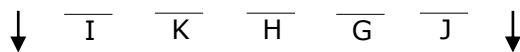
## Mittal Commerce Classes

46. Ans. a  
Explanation:  
M -  
T - A  
W - D  
Th - C  
Fri - B  
Sat - E

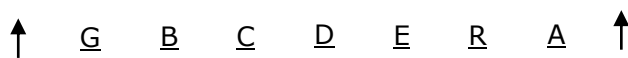
47. Ans. a  
Explanation:



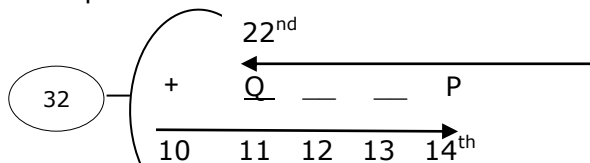
48. Ans. a  
Explanation:



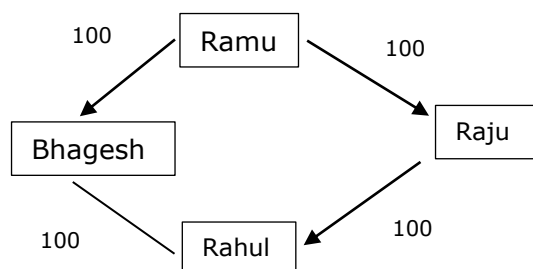
49. Ans. a  
Explanation:



50. Ans. c  
Explanation:



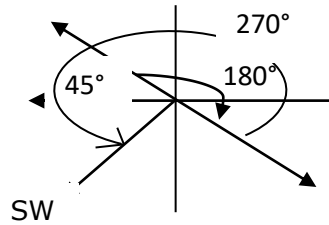
51. Ans. b  
Explanation:



## Mittal Commerce Classes

52. Ans. a

Explanation:

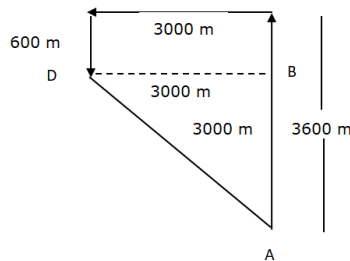


53. Ans. b

Explanation:

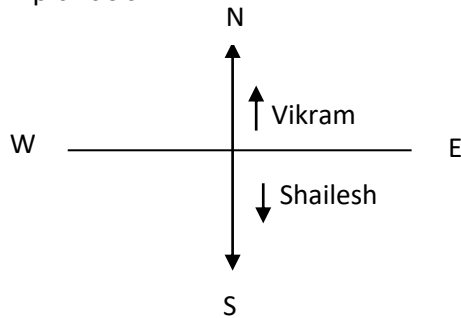
$$AD^2 = AB^2 + BD^2$$

$$AD^2 = 4243m$$



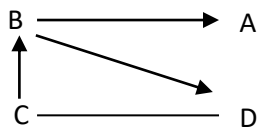
54. Ans. c

Explanation:



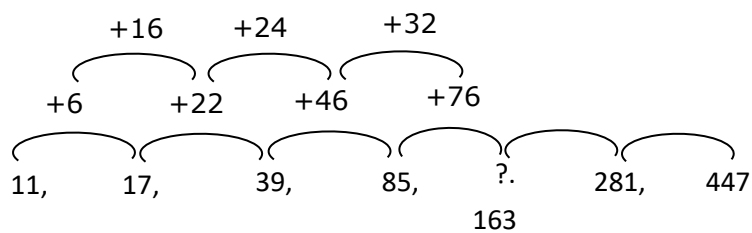
55. Ans. b

Explanation:



56. Ans. d

Explanation:



57. Ans. c

Explanation:

$$1^2 \times 0 = 0$$

$$2^2 \times 1 = 4$$

$$3^2 \times 2 = 18$$

$$4^2 \times 3 = 48$$

## Mittal Commerce Classes

$$5^2 \times 4 = 100$$

$$6^2 \times 5 = 180$$

58. Ans. a

Explanation:

|        |        |           |
|--------|--------|-----------|
| D → #  | S → *  | D E L A Y |
| A → %  | T → \$ | # @ ↑ % © |
| T → \$ | Y → ©  |           |
| E → @  | L → ↑  |           |
|        | E → @  |           |

59. Ans. d

Explanation:

go and come → na ka (ta)

Black and White → pa ma (ta)

go → na or Ka

60. Ans. d

Explanation:

$$24 \div 4 \times 8 + 6 - 4$$

$$6 \times 8 + 6 - 4$$

$$48 + 6 - 4$$

$$54 - 4 = 50$$

61. Ans. a

Explanation:

Pie chart is the most appropriate to represents various heads in total cost.

62. Ans. b

Explanation:

$$\text{Angle of } S_3 = \frac{90}{432} \times 360^\circ = 75^\circ$$

63. Ans. c

Explanation:

External presentation is not a mode of presentation of data.

64. Ans. d

Explanation:

$$\begin{aligned} \text{No. of class intervals} &= \frac{\text{Range}}{\text{Class Size}} \\ &= \frac{78 - 40}{5} = 7.6 = 8 \end{aligned}$$

65. Ans. c

Explanation:

Law of Statistical Regularity says that a large sample drawn at random from the population would possess the characteristics of the population on an average.

## Mittal Commerce Classes

66. Ans. a  
 Explanation:  
 Sampling Fluctuations may be described as the variation in the values of a statistic.
67. Ans. d  
 Explanation:  
 The number of factors must be known are 3 in determining the sample size for estimating a population mean.
68. Ans. c  
 Explanation:  
 The permissible sampling error is required to determine sample size for estimating a proportion or estimating a mean.
69. Ans. a  
 Explanation:  

$$M = \text{Simple Average of two middle terms}$$

$$= \frac{n+2 + n+4}{2} = 22$$

$$= 2n + 6 = 44$$

$$2n = 38$$

$$n = 19$$
70. Ans. b  
 Explanation:  

$$HM = \frac{GM^2}{AM} = \frac{16^2}{64} = 4$$
71. Ans. b  
 Explanation:  
 Total of 50 = 261  
 Total of 10 =  $2.5 \times 10 = 25$   
 Total of remaining 40 =  $261 - 25 = 236$   
 Average of 40 =  $236/40 = 5.9$
72. Ans. b  
 Explanation:  
 Modal class = 21 - 28  
 $l_1 = 21, i = 7, f_1 = 72, f_0 = 36, f_2 = 51$
- $$Z = 21 + \frac{72 - 36}{144 - 36 - 51} \times 7$$
- $$Z = 21 + \frac{36}{57} \times 7 = 25.42$$
73. Ans. d  
 Explanation:  
 Combined H.M. =  $\frac{\frac{n_1 + n_2}{\frac{n_1}{H_1} + \frac{n_2}{H_2}}}{\frac{n_1 H_2 + n_2 H_1}{H_1 H_2}}$

$$= \frac{(n_1 + n_2) H_1 H_2}{n_1 H_2 + n_2 H_1}$$

74. Ans. b

Explanation:

$$\begin{aligned} Z &= 3M - 2\bar{X} \\ &= 3 \times 27.9 - 2 \times 26.8 \\ &= 30.1 \end{aligned}$$

75. Ans. c

Explanation:

$$2\bar{x} + 3\bar{y} - 7 = 0$$

$$2 + 3\bar{y} - 7 = 0$$

$$\bar{y} = \frac{5}{3}$$

$$MD_y = |b| \cdot MD_x$$

$$= \frac{2}{3} \times \frac{0.6}{10}$$

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

$$CMD_y = \frac{\frac{4}{10}}{\frac{5}{3}} \times 100$$

$$= \frac{4 \times 100 \times 3}{5 \times 10}$$

$$= 24$$

76. Ans. c

Explanation:

Let S.D. of given observations be x

∴ Sample 1 is x-9

∴ SD of Sample 1 is x

∴ Sample 2 is 10x

∴ S.D. of Sample 2 is 10x

∴ Sample 3 is 2x-5

∴ S.D. of sample 3 is 2x

$$\begin{array}{ccc} S_1 & S_2 & S_3 \\ x & 10x & 2x \end{array}$$

This is possible in option c

77. Ans. b

Explanation:

Explanation:

$$\bar{X} = \frac{2+3+6+4+9}{5} = 6.80$$

$$\text{Variance} = \frac{2^2 + 3^2 + 6^2 + 4^2 + 9^2}{5} - (4.80) = 6.16$$

78. Ans. b

Explanation:

$$Q_1 = 142$$

$$Q.D = 18$$

$$18 = \frac{Q_3 - 142}{2}$$

$$Q_3 = 178$$

$$M = \frac{142 + 178}{2} = 160$$

79. Ans. d

Explanation:

$$2^{\text{nd}} \text{ Central moments} = \frac{\sum (X - \bar{X})^2}{n} = \frac{\sum x^2}{n} (\because \bar{X} = 0)$$

$$= \frac{112}{7} = 16$$

$$3^{\text{rd}} \text{ Central moments} = \frac{\sum (X - \bar{X})^3}{n} = \frac{\sum x^3}{n} = 0$$

80. Ans. d

Explanation:

$$P(30R7) = P(3) + P(7) - P(3 \& 7)$$

$$= \frac{33}{100} + \frac{14}{100} - \frac{4}{100} = \frac{43}{100}$$

81. Ans. c

Explanation:

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$P(A \cup B) = 1 - P(\bar{A}) + 1 - P(\bar{B}) - P(A \cap B)$$

$$P(\bar{A}) + P(\bar{B}) = 2 - P(A \cap B) - P(A \cup B)$$

$$= 2 - 0.8 - 0.3 = 0.9$$

82. Ans. c

Explanation:

$$SD \text{ of } x = \sqrt{E(X^2) - \mu^2}$$

$$E(X^2) = P_1 X_1^2 + P_2 X_2^2 + \dots$$

$$\mu = P_1 X_1 + P_2 X_2 + \dots$$

$$SD \text{ of } x = 1.69$$

83. Ans. a

Explanation:

$$P(A) = \frac{2}{5} \quad P(\bar{A}) = \frac{3}{5}$$

$$P(B) = \frac{4}{10} \quad P(\bar{B}) = \frac{6}{10}$$

$$\text{Prob. of only one} = P(A) P(\bar{B}) + P(B) P(\bar{A})$$

$$= \frac{12}{25}$$

$$\text{then } y = 12$$

84. Ans. d

Explanation:

Variance of a random variable x is given by  $E(x - \mu)^2$  or  $E[x - E(x)]^2$ .

85. Ans. c

Explanation:

$$\mu = P_1 X_1 + P_2 X_2$$

$$= 50000 \times 0.75 - 20000 \times 0.25$$

$$= 32500$$

86. Ans. b

Explanation:

$$P = .03, q = .97, n = 4, x = 0$$

$$P(x = 0) = {}^4C_0 (.03)^0 (.97)^4 \\ = 0.8852$$

87. Ans. b

Explanation:

$$P(X = 2) = P(X = 3)$$

$$\frac{e^{-m} \cdot m^2}{2!} = \frac{e^{-m} \cdot m^3}{3!}$$

$$m = 3 \quad \text{Variance} = 3$$

88. Ans. b

Explanation:

$$p = 0.20, \quad q = 0.80$$

$$n = 6, \quad x = 4, 5, 6$$

$$p(X = 4, 5, 6) = {}^6C_4 (.2)^4 (.8)^2 + {}^6C_5 (.2)^5 (.8)^1 + {}^6C_6 (.2)^6 (.8)^0 \\ = 0.1696$$

89. Ans. c

Explanation:

$$\mu = np = 7$$

$$\sigma^2 = npq = 6$$

$$7q = 6$$

$$q = 6/7$$

$$p = 1/7$$

90. Ans. c

Explanation:

$$\mu = 10 \quad 2\sigma^2 = 72$$

$$\sigma = 6$$

$$Q_1 = \mu - 0.675\sigma = 10 - 0.675 \times 6 \\ = 5.95$$

91. Ans. a

Explanation:

$$r_R = 1 - \frac{6 \sum D^2}{n(n^2 - 1)}$$

$$= 1 - \frac{6 \times 44}{6(6^2 - 1)}$$

$$= 1 - \frac{44}{35}$$

$$= -0.25$$

92. Ans. b

Explanation:

The product of the standard deviations should be more than 25.

93. Ans. a  
 Explanation:  
 correlation coefficient is not affected by change in origin & scale but affected by sign only.  
 $r_{uv} = r$
94. Ans. b  
 Explanation:  
 $r = +1, \quad b_{yx} = 1.28, \quad \sigma_x = 2$   
 $b_{yx} = r \cdot \frac{\sigma_y}{\sigma_x}$   
 $1.3 = 1 \cdot \frac{\sigma_y}{2}$   
 $\sigma_y = 2 \times 1.28 = 2.56$   
 $\sigma_y = 6.56$
95. Ans. c  
 Explanation:  
 Use Hit & Trial method  
 $x = 1, \quad y = -1$
96. Ans. c  
 Explanation:  
 CPI 240 Shows 140% increament  
 $\therefore \text{New Salary} = 10000 + 140\%$   
 $= 24000$
97. Ans. a  
 Explanation:  
 $P_{01} = \sqrt{\frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times \frac{\sum P_1 Q_1}{\sum P_0 Q_1}} \times 100$   
 $P_{01} = \sqrt{\frac{63}{52} \times \frac{59}{52}} \times 100$   
 $= 117.24$
98. Ans. d  
 Explanation:  
 The three index numbers, namely, Laspeyre, Paasche and Fisher do not satisfy circular test.
99. Ans. a  
 Explanation:  
 Price Relative =  $\frac{P_1}{P_0}$
100. Ans. c  
 Explanation:  
 $F = \sqrt{L \times P} = \sqrt{110 \times 108}$   
 $= 108.99$

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