

(1) Ans. d

Explanation:

Equation $5x^2 + 8x + 7 = 0$ and roots are α, β thenSum of roots $\alpha + \beta = -8/5$ Product of roots $\alpha\beta = 7/5$

$$\text{Now } \frac{\alpha}{\beta^2} + \frac{\beta}{\alpha^2}$$

$$= \frac{\alpha^3 + \beta^3}{\alpha^2\beta^2} \Rightarrow \frac{(\alpha + \beta)^3 - 3\alpha\beta(\alpha + \beta)}{(\alpha\beta)^2}$$

$$= \frac{328}{245}$$

(2) Ans. c

Explanation:

$$\log_{.01} .00000001 = \log_{.01} (.01)^4 = 4$$

$$\log_{\sqrt{3}} 81 = \log_{(\sqrt{3})} (\sqrt{3})^8 = 8$$

so ratio is 4 : 8

$$1 : 2$$

(3) Ans. b

Explanation:

Sum of male and female employees Can not be more than ten so option (b) shows right inequality.

(4) 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.

(5) Ans. d

Explanation:

$$x = 7^{\frac{1}{3}} - 7^{-\frac{1}{3}}$$

$$x^3 = 7 - \frac{1}{7} - 3x$$

$$x^3 + 3x = \frac{48}{7}$$

$$7x^3 + 21x = 48$$

(6) Ans. a

Explanation:

$$\log_2 \log_2 \log_3 x = 0$$

$$\log_2 \log_3 x = 2^0 = 1$$

$$\log_3 x = 2^1 = 2$$

$$x = 3^2$$

$$= \boxed{9}$$

(7) Ans. b

Explanation:

$$\text{Required sum} = (16)^2 + \frac{1}{2}(16)^2 + \frac{1}{4}(16)^2 + \dots$$

$$= (16)^2 \left[1 + \frac{1}{2} + \frac{1}{4} + \dots \right]$$

$$= (16)^2 \left[\frac{1}{1 - \frac{1}{2}} \right] = 512 \text{ sq. cm}$$

(8) Ans. d

Explanation:

$$\frac{\log x}{2} = \frac{\log y}{3} = \frac{\log z}{5} \text{ then } yz = ?$$

$$\text{Sol. Let } \frac{\log x}{2} = \frac{\log y}{3} = \frac{\log z}{5} = k$$

$$\log_e x = 2k$$

$$\therefore e^{2k} = x$$

$$\log_e y = 3k$$

$$e^{3k} = y$$

$$\log_e z = 5k$$

$$e^{5k} = z$$

$$\text{Now : } yz \Rightarrow e^{3k} \cdot e^{5k}$$

$$\Rightarrow e^{8k}$$

$$\Rightarrow e^{4k \times 2}$$

$$\Rightarrow (e^{2k})^4$$

$$\Rightarrow (x)^4$$

(9) Ans. b

Explanation:

$-2x + 3y \geq 6$ Cuts on X axis $(-3, 0)$

Y axis $(0, 2)$

and y is more than x so option (B) is Correct.

(10) Ans. C

Explanation:

Let the total Capital be Rs. X

$$\text{Then } \left(\frac{X}{3} \times \frac{7}{100} \times 1 \right) + \left(\frac{X}{4} \times \frac{8}{100} \times 1 \right) + \left(\frac{5X}{12} \times \frac{10}{100} \times 1 \right) = 561$$

$$X = 6600$$

(11) Ans. a

Explanation:

$$\begin{aligned} A &= \frac{R}{r} [(1+r)^n - 1] \\ &= \frac{6000}{0.09} [(1+0.09)^8 - 1] \\ &= \text{Rs. } 66170.84 \end{aligned}$$

(12) Ans. a

Explanation:

First Time

$$A = 3x$$

$$P = x$$

$$n = 6$$

$$\therefore 3x = x \left[1 + \frac{r}{100} \right]^6$$

$$3 = \left[1 + \frac{r}{100} \right]^6$$

Second Time

$$A = 27x$$

$$P = x$$

$$n = ?$$

$$27x = x \left[1 + \frac{r}{100} \right]^n$$

$$(3)^3 = \left[1 + \frac{r}{100} \right]^n$$

$$\left\{ \left[1 + \frac{r}{100} \right]^6 \right\}^3 = \left(1 + \frac{r}{100} \right)^n$$

$$\left(1 + \frac{r}{100} \right)^{18} = \left(1 + \frac{r}{100} \right)^n \Rightarrow n = 18$$

(13) Ans. c

Explanation:

$$\text{Ram:Shyam} = 3:4$$

$$\text{Shyam:Mohan} = 4:5$$

$$\therefore \text{Amount of Mohan will be} = \frac{5}{3} \times 600 = 1000$$

- (14) Ans. a
 Explanation:
 Boys : Girls = 3 : 5.
 Sum of the ratios = 3 + 5 = 8.
 Number of boys in the school = $(3 \times 720) / 8 = 270$
 Number of girls in school = $(5 \times 720) / 8 = 450$.
 Let the number of new boys admitted be x, then number of boys become (270 + x).
 After admitting 18 new girls, the number of girls become 450 + 18 = 468.
 According to given condition of the problem : $(270 + x) / 468 = 2/3$
 $\Rightarrow 3(270 + x) = 2 \times 468$ or $810 + 3x = 936$ or $3x = 126$ or $x = 42$.

- (15) Ans. b
 Explanation:
 If 1st man spent = Rs. 125
 2nd man spent = Rs. 125
 Similarly 125 man spent = Rs. 125
 So 125 men spent Rs. 125th each, therefore the total money spent by them is given by $125 \times 125 = 15625$

- (16) Ans. c
 Explanation:
 $a + b + c = 0$,
 $a + b = -c$,
 $(a + b)^2 = c^2$,
 $a^2 + b^2 + 2ab = c^2$
 $a^2 + b^2 = c^2 - 2ab$
 $\frac{a^2 + b^2 + c^2}{c^2 - ab} = \frac{c^2 - 2ab + c^2}{c^2 - ab} = 2$

- (17) Ans. c
 Explanation:

$$\frac{(243)^{\frac{n}{5}} \cdot 3^{2n+1}}{9^n \times 3^{n-1}} = \frac{(3^5)^{\frac{n}{5}} \times 3^{2n+1}}{(3^2)^n \times 3^{n-1}} = \frac{3^{\left(5 \times \frac{n}{5}\right)} \times 3^{2n+1}}{3^{2n} \times 3^{n-1}} = \frac{3^n \times 3^{2n+1}}{3^{2n} \times 3^{n-1}}$$
 Here

$$= \frac{3^{n+(2n+1)}}{3^{2n+n-1}} = \frac{3^{(3n+1)}}{3^{(3n-1)}} = 3^{(3n+1)-(3n-1)} = 3^2 = 9.$$

- (18) Ans. b
 Explanation :
 Suppose that I am x years old and my son is y years old. Then, according to question,
 $x = 3y$...(i)
 and $x + 5 = \frac{5}{2}(y + 5)$...(ii)

from (i) and (ii), $3y+5=\frac{5}{2}(y+5)$

$$\Rightarrow 6y+10=5y+25$$

$$\Rightarrow y = 15$$

Substituting in (i) gives, $x = 3 \times 15 = 45$

Hence, my age = 45 years.

(19) Ans. c

Explanation:

$$\frac{A}{B} \times \frac{B}{C} \times \frac{C}{D} = \frac{2}{3} \times \frac{4}{5} \times \frac{5}{8}$$

$$\frac{A}{D} = \frac{1}{3}$$

(20) Ans. c

Explanation:

$$\int \frac{8^{1+x} + 4^{1-x}}{2^x} dx$$

$$= \int \frac{2^{3x+3} + 2^{2-2x}}{2^x} dx$$

$$= \int (2^{2x+3} + 2^{2-3x}) dx$$

$$= \frac{2^{2x+3}}{2 \log 2} + \frac{2^{2-3x}}{(-3) \log 2} + c$$

$$= \frac{2^{2x+3}}{2 \log 2} - \frac{2^{2-3x}}{3 \log 2} + c$$

(21) Ans. c

Explanation:

$$a:b = b:c$$

$$b^2 = ac$$

$$a^4 : (b^2)^2$$

$$a^4 : (ac)^2$$

$$a^4 : a^2 c^2$$

$$a^2 : c^2$$

(22) Ans. c

Explanation :

Since the cost curve is linear we consider cost curve as $y = Ax + B$ where y is total cost. Now for $x = 80$, $y = 2,20,000$. $\therefore 2,20,000 = 80A + B$(i)

and for $x = 125$; $y = 2,87,500$ $\therefore 2,87,500 = 125A + B$(ii)

Subtracting (i) from (ii) $45A = 67,500$ or $A = 1500$

From (i) $2,20,000 - 1500(80) = B$ or $B = 2,20,000 - 1,20,000 = 1,00,000$

Thus equation of cost line is $y = 1,500x + 1,00,000$.

For $x = 95$, $y = 1,42,500 + 1,00,000 = \text{Rs. } 2,42,500$.

\therefore Cost of 95 T.V. set will be Rs. 2,42,500.

(23) Ans. b

Explanation:

Roots are -3, 1, 2 then

Factors are $x + 3$, $x - 1$, $x - 2$ and equation is $(x + 3)(x - 1)(x - 2) = 0$

$$x^3 - 7x + 6 = 0$$

(24) Ans. d

Explanation:

$$x = \sqrt{1+x}$$

$$x^2 = 1+x$$

$$x^2 - x - 1 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \text{ from quadratic equation}$$

$$x = \frac{+1 \pm \sqrt{5}}{2}$$

$$x = \frac{+1 + \sqrt{5}}{2} \text{ only this solution is possible}$$

(25) Ans. b

Explanation:

$${}^{n+2}C_r = {}^{n+2}C_{10-r}$$

$$\text{or } n+2 = r+10-r$$

$$\text{or } n = 8$$

$$\text{then } {}^8C_6 = \boxed{28}$$

(26) Ans. C

Explanation:

We have DRCTRIO

$$= \frac{6! \times 3!}{2!} = 2160$$

(27) Ans. D

Explanation:

$$\text{Required number of numbers} = 5 \times 4 \times 1 = 20$$

(28) Ans. D

Explanation:

$$\begin{aligned} \text{No. of ways} &= {}^7C_4 \times {}^3C_2 + {}^7C_3 \times {}^3C_3 \\ &= 105 + 35 = 140 \end{aligned}$$

(29) Ans. b

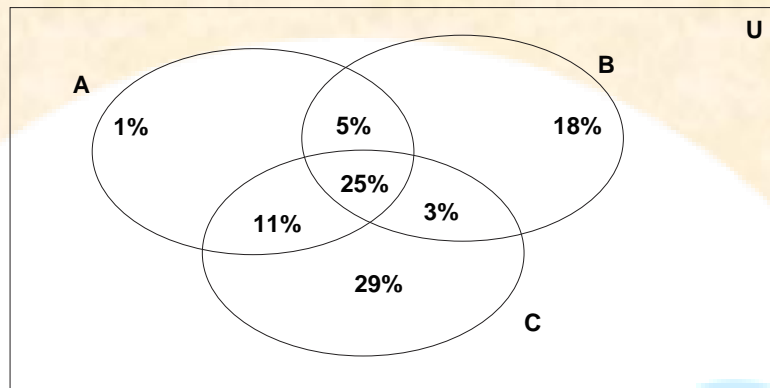
Explanation:

By formula

$$n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$$

$$92\% = 42\% + 51\% + 68\% - 30\% - 28\% - 36\% + n(A \cap B \cap C)$$

$$n(A \cap B \cap C) = 25\%$$



The percentage of persons who read only one paper
 $= 1\% + 18\% + 29\% = 48\%$

(30) Ans. b

Explanation:

$$S_{\infty} = \frac{a}{1-r} = \frac{\sqrt{3}}{1-\frac{1}{3}} = \frac{3\sqrt{3}}{2}$$

(31) Ans. b

Explanation:

$$f(x) = \sqrt{x + \sqrt{x + \dots \infty}}$$

$$\Rightarrow f(x) = \sqrt{x + f(x)}$$

On squaring both sides, we get

$$[f(x)]^2 = x + f(x)$$

differentiation both sides

$$2f(x) f'(x) = 1 + f'(x)$$

$$f'(x) [2f(x) - 1] = 1$$

$$f'(x) = \frac{1}{2f(x) - 1}$$

(32) Ans. a

Explanation:

$$\text{No. of ways that can be formed by using the word 'BANANA'} = \frac{6!}{3!2!} = 60$$

$$\text{No. of ways in which two N comes together} = \frac{5!}{3!} = 20$$

$$\therefore \text{Required No. of ways} = 60 - 20 = 40$$

(33) Ans. d

Explanation:

$$(a, a), (b, b), (c, c) \in R$$

So R is a reflexive relation

But $(a, b) \in R$ and $(b, a) \notin R$

Thus, R is not a symmetric relation.

Also, $(a, b), (b, c) \in R \Rightarrow (a, c) \notin R$

Hence R is not a transitive relation

(34) Ans. a

Explanation:

$$n(A - B) = n(A) - n(A \cap B)$$

$$47 = 115 - n(A \cap B)$$

$$n(A \cap B) = 68$$

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

$$= 115 + 326 - 68 = 373$$

(35) Ans. a

Explanation :

$$\int_{-1}^1 (x^5 - 3x^3 + 2x) dx = 0$$

$$\int_{-a}^a f(x) dx = 0 \text{ if } f(x) \text{ is odd function}$$

(36) Ans. a

(37) Ans. a

(38) Ans. a

(39) Ans. b

(40) Ans. a

(41) Ans. a

(42) Ans. a

(43) Ans. a

(44) Ans. c

(45) Ans. b

(46) Ans. c

(47) Ans. a

(48) Ans. a

(49) Ans. c

(50) Ans. c

(51) Ans. b

(52) Ans. b

(53) Ans. d

(54) Ans. b

(55) Ans. a

(56) Ans. c

(57) Ans. d

(58) Ans. d

(59) Ans. d

(60) Ans. a

(61) Ans. a

(62) Ans. d

(63) Ans. c

Explanation:

Arrange the observations in ascending order: $\frac{x}{7}, \frac{x}{6}, \frac{x}{5}, \frac{x}{3}, \frac{x}{2}, x$

Median = size of $\frac{6+1}{2} = 3.5^{th}$ term

$$\text{Median} = \frac{\text{size of 3rd term} + \text{size of 4th term}}{2} \Rightarrow 24 = \frac{\frac{x}{5} + \frac{x}{3}}{2} \Rightarrow x = 90$$

(64) Ans. c

Explanation : Average speed = $\frac{2ab}{a+b}$

$$150 = \frac{2 \times 120 \times b}{120 + b}$$

$$b = 200 \text{ km/h}$$

(65) Ans. d

Explanation:

$$\begin{aligned} \text{G.M.} &= (4 \times 20 \times 36)^{\frac{1}{3}} \\ &= (4^3 \sqrt{45}) \end{aligned}$$

(66) Ans. b

Explanation:

Quartile deviation does not depend on extreme values. So quartile deviation can be calculated for open end classes.

(67) Ans. d

(68) Ans. b

Explanation:

$$\text{Standard Deviation } (\sigma) = \sqrt{\text{Variance}}$$

$$= \sqrt{100} = 10$$

$$\therefore \text{Mode} = 3 \text{ Median} - 2 \text{ Mean}$$

$$29 = (3 \times 23) - 2 \text{ Mean}$$

$$\text{Mean} = (69 - 29) / 2 = 20$$

$$\therefore \text{Coefficient of variation (CV)} = \frac{\sigma}{\bar{X}} \times 100$$

$$\therefore \text{CV} = \frac{10}{20} \times 100 = 50\%$$

(69) Ans. c

(70) Ans. b

Explanation:

$$n = 32, \sigma = 5, \Sigma x = 80$$

$$\sigma = \sqrt{\frac{\Sigma x^2}{n} - (\bar{x})^2}$$

$$(5)^2 = \frac{\Sigma x^2}{32} - 6.25$$

$$\Sigma x^2 = 1000$$

(71) Ans. c

Explanation:

(72) Ans. b

(73) Ans. a

Explanation:

$$\text{The regression line : } y - \bar{y} = b_{yx} (x - \bar{x})$$

$$\text{or } y - 8.8 = 1.24(x - 5.5)$$

$$\Rightarrow y = 1.24x + 1.98$$

(74) Ans. b

Explanation:

The two lines of regression are

$$2x - 7y + 6 = 0$$

....(1)

and $7x - 2y + 1 = 0$

....(2)

If we take (1) as the regression equation of Y on X, then (2) is that of X on Y. We can write these as :

$$y = \frac{2}{7}x + \frac{6}{7} \quad \text{and} \quad x = \frac{2}{7}y - \frac{1}{7}$$

respectively.

$$\therefore b_{yx} = \frac{2}{7} \quad \text{and} \quad b_{xy} = \frac{2}{7}$$

$$\Rightarrow b_{yx} b_{xy} = \frac{2}{7} \times \frac{2}{7} = \frac{4}{49} < 1$$

So, our choice is valid.

$$r^2 = b_{yx} b_{xy} = \frac{4}{49} \Rightarrow r = \frac{2}{7}$$

Now,

(Note that $b_{yx} > 0$), so $r > 0$

(75) Ans. b

Explanation :

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

$$0.8 = 1 - \frac{6\sum d^2}{990}$$

$$\sum d^2 = 33$$

$$\text{Cor. } \sum d^2 = 33 - (7)^2 + (9)^2 = 65$$

$$\text{Cor. } r_R = 1 - \frac{6 \times 65}{990}$$

$$= 0.61$$

(76) Ans. a

Explanation:

Laspeyre's Price Index is based on base year Quantity.

$$L = \frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times 100$$

Since Formula is

Hence Q_0 is constant.

(77) Ans. d

Explanation:

$$P_{01} = \sqrt{\frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times \frac{\sum P_1 Q_1}{\sum P_0 Q_1}} \times 100 = 94.88$$

(78) Ans. d

Explanation : Regression coefficient are independent of change of origin but not scale
(As per Fundamental Principle)

(79) Ans. b

Explanation : Chain index for any year

$$= \frac{\text{Link relative (index) of current year} \times \text{Chain index of the previous year}}{100}$$

(80) Ans. d

Explanation:

Using Formula : Real wage = $\frac{\text{Money wage}}{\text{Price Index}} \times 100$

$$\Rightarrow 1680 = \frac{\text{Money Wage}}{\left(\frac{215}{120} \times 100\right)} \times 100$$

$$\therefore \text{Money Wage} = \frac{215}{120} \times 1680 = 3010 \text{ Rs.}$$

$$\therefore \text{Loss of worker} = 3010 - 3000 = 10 \text{ Rs.}$$

(81) Ans. b

(82) Ans. c

(83) Ans. b

Explanation:

Dorbish-Bowley's index number = $\frac{L+P}{2} = 145$

$$L = 290 - P = 140$$

$$f = \sqrt{L \times P} = \sqrt{140 \times 150} = 144.91$$

(84) Ans. a

(85) Ans. b

(86) Ans. c

Explanation : $P(A_1).P(A_2) = \frac{2}{3} \times \frac{3}{8} = \frac{1}{4} = P(A_1 \cap A_2)$

So, A_1 and A_2 are Independent but not mutually exclusive

(87) Ans. d

(88) Ans. a

Explanation :

Commodity	A	B	C	D	E	F
Group Index (R)	120	132	98	115	108	98
Weight (W)	6	3	4	2	1	4
(RW)	720	396	392	230	108	392

$$\text{General Index} = \frac{\sum RW}{\sum W} = \frac{2238}{20} = 111.90$$

(89) Ans. b

Explanation:

$$p = \frac{1}{5000}, n = 10000, m = np = 2$$

$$p(x = 0) = \frac{e^{-2}(2)^0}{0!} = e^{-2}$$

(90) Ans. d

Frequency of class = 5

First change inclusive class 49-53 in to exclusive form

So class is 48.5-53.5

Class length = 53.5-48.5=5

$$\text{Frequency density} = \frac{\text{Frequency of class}}{\text{Class length}}$$

$$\text{Frequency density} = \frac{5}{5} = 1$$

(91) Ans. b

Explanation: Less than ogive & more than Ogive intersect at a point called MEDIAN or we can say second quartile.

(92) Ans. d

Explanation:

$$\therefore \sum P = 1 \Rightarrow 3k + 5k + 2k + 4k + 3k + 3k = 1 \Rightarrow 20k = 1 \Rightarrow k = 0.05$$

x	1	2	3	4	5	6	
P	0.15	0.25	0.1	0.2	0.15	0.15	$\sum P = 1$
Px	0.15	0.5	0.3	0.8	0.75	0.9	$\sum Px = 3.4$

$$\text{Expected value } E(x) = \sum Px = 3.4$$

(93) Ans. b

(94) Ans. a

(95) Ans. c

(96) Ans. c

(97) Ans. c

(98) Ans. b

$$u = \frac{x-a}{b} \quad v = \frac{y-c}{d}, \text{ then } r_{xy} = \frac{bd}{|b||d|} r_{uv}$$

We know that if

$$u = -5x + 6 = \frac{x-6/5}{(-1/5)}, v = \frac{(y-20/3)}{(7/3)}$$

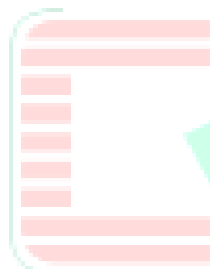
$$\text{Here } b = -1/5, d = 7/3$$

Since $b = -1/5$ and $d = 7/3$ are of opposite sign, so $r_{uv} = -r_{xy} = -0.58$.

(99) Ans. d

(100) Ans. c

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