(GCF-1, GCF-3, GCF-5 to GCF-7, SCF-1, SCF-3, VCF-1 &VCF-3)

TIMING: 2 Hours

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PAPER: BUSINESS MATHEMATICS, REASONING & STATISTICS

(1) Ans. c

Explanation:

$$\int \frac{dx}{x^2+2x-3} = \int \frac{dx}{x^2+2x+1-4}$$

$$= \int \frac{dx}{(x^2+1)^2-2^2}$$

$$\therefore \int \frac{dx}{x^2-a^2} = \frac{1}{2a}\log\left(\frac{x-a}{x+a}\right)+c$$

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

(2) Ans. c

Explanation:

Taking logarithms, we may write

$$\log y = \frac{1}{2}[\log(1-x)-\log(1+x)]$$

[differentiation] $\frac{1}{y}\frac{dy}{dx} = \frac{1}{2}\left[\frac{-1}{1-x}-\frac{1}{1+x}\right]$

By cross multiplication

$$(1-x^2)\frac{dy}{dx} = -y$$

(3) Ans. a

Explanation:

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

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

(4) Ans. a

Explanation:

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

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

(5) Ans. c

Explanation:

$$\int f'(x) = \int (x-1)$$

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

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

passing through the point (2,0)

c = 0

y = $\frac{x^2}{2} - x$

(6) Ans. b

Explanation:

T_5= a+4d =14 ..... (i)

T_{12} = a+11d =35 ..... (ii)

On solving equation (i) and (ii)

a=2

(7) Ans. d

Explanation:

$s_n = \sum n(n+1)$

$s_n = \sum n^2 + \sum n$

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

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

(8) Ans. d

Explanation:

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

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

R= 50,000

(9) Ans. c

Explanation:

No of diagonals in a polygon with n sides

= $^nC_2$-n = $\frac{n(n-3)}{2}$

(10) Ans. b

Explanation:

Here, we have an A.P. with a = 3,00,000 d= 10,000

And n = 20

Using the sum formula , we get,

$S_{20} = \frac{20}{2} = [6,00,000 + 19\,X\,10,000]$

= 79,00,000

(11) Ans. b

Explanation:

a=3 , r= $\frac{1}{2}$

$s_n = \frac{a(1-r^n)}{1-r}$

$\frac{3069}{512} = \frac{3[1-\frac{1}{2^n}]}{1-\frac{1}{2}}$

$\frac{3069}{3072} = 1-\frac{1}{2^n}$

$\frac{1}{2^n} = \frac{1}{1024}$

n= 10

(12) Ans. c

Explanation:

a=132 ,l = 468

l = a +(n-1)d

468 = 132 + (n-1)(12)

n =29

$s_n = \frac{n}{2}(a+l)$

$s_{29} = \frac{29}{2}(132+468) = 8700$

(13) Ans. b

Explanation:

$\begin{bmatrix}1\\2\\5\end{bmatrix} X \begin{bmatrix}3 & 4 & 5 & 6\end{bmatrix}$

$= \begin{bmatrix}3 & 4 & 5 & 6\\6 & 8 & 10 & 12\\15 & 20 & 25 & 30\end{bmatrix}$

(14) Ans. b

Explanation:
R is reflexive and symmetric but not transitive, since (1,2) ∈R and (2,3) ∈R but (1,3) does not belong to R.

(15) Ans. c
Explanation:

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

12x-16 ≥ 2x-6
10x ≥ 10
X ≥ 1

(16) Ans. c
Explanation:
D = b^2-4ac
= $(-8)^2$–4(3)(4)
= 16
If D ≥ 0 and a perfect square then roots are real, rational and unequal.

(17) Ans. a
Explanation:

Sum of roots (α+β) = $\frac{-b}{a} = 2$

Product of roots (αβ) = $\frac{c}{a} = -\frac{1}{2}$

$$(\alpha+\beta)^3 = a^3+\beta^3+3\alpha\beta(\alpha+\beta)$$

$$(2)^3 = \alpha^3+\beta^3+3\left(-\frac{1}{2}\right)(2)$$

$$\alpha^3+\beta^3 = 11$$

(18) Ans. b
Explanation:
By option -1, 3, 4

(19) Ans. c
Explanation:

	Grade I	Grade II	
Plant A	6	3	≤ 120
Plant B	4	10	≤ 180

6x +3y≤ 120
4x +10y ≤ 180

(20) Ans. c
Explanation:
A X B = { (2,4), (2,5) ,(3,4),(3,5) }
B X C = { (4,5),(4,6)(5,5)(5,6) }
(A X B)U (B X C) = {(2,4), (2,5) ,(3,4),(3,5), (4,5),(4,6)(5,5)(5,6) }

(21) Ans. d
Explanation:

$B^2 = \begin{bmatrix} 1 & 1 \\ 8 & 3 \end{bmatrix} X \begin{bmatrix} 1 & 1 \\ 8 & 3 \end{bmatrix}$

$= \begin{bmatrix} 9 & 4 \\ 32 & 17 \end{bmatrix}$

$B^2\text{-}4B = \begin{bmatrix} 9 & 4 \\ 32 & 17 \end{bmatrix} - \begin{bmatrix} 4 & 4 \\ 32 & 12 \end{bmatrix}$

$= \begin{bmatrix} 5 & 0 \\ 0 & 5 \end{bmatrix}$

(22) Ans. b
Explanation:
n(m U E) = n (m)+ n(E) – n(m ∩ E)
= 40% + 30%-10%
= 60%
The percentage of students who passed in both subject = 100% – 60% = 40%.

(23) Ans. c
Explanation:

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

$\frac{25}{16}P = P(1+\frac{r}{100})^2$

$\left(\frac{5}{4}\right)^2 = (1+\frac{r}{100})^2$

$\frac{5}{4} = 1+\frac{r}{100}$

r = 25%

(24) Ans. d
Explanation:
first part = x , second part = 2600-x

$\frac{x\times 3\times 5}{100} = \frac{(2600-x)\times 6\times 4}{100}$

15x = 62,400-24x
39x = 62,400
X = 1,600
Second part = 2,600 – 1,600
= Rs. 1,000

(25) Ans. c

Explanation:
Let the ages of A and B are 5x and 7x
5x +9 = 2(7x - 9)
5x +9 = 14x – 18
X =3
The present age of B = 7x = 7 X 3 = 21 years.

(26) Ans. c
Explanation:
Product of extreme terms = product of mean terms
(23 – x) (78 - x) = (30 - x) (57 - x)
x = 6

(27) Ans. c
Explanation:

$$A = P(1+\frac{5}{100})^{n}$$

$$A = P\left(\frac{21}{20}\right)^{n}$$

$$\frac{P}{A} = \left(\frac{20}{21}\right)^{n}$$

(28) Ans. a
Explanation:
A = 5B , A = 3C
A + B + C =1380

$$A+\frac{A}{5}+\frac{A}{3}=1380$$

A = 900
A = 3C
900 = 3C
C=300

(29) Ans. d
Explanation:
No. of different ways can be failed =2^4-1

(30) Ans. a
Explanation:

$$\frac{4a^{\frac{1}{2}+\frac{2}{3}-\frac{7}{3}}}{3a^{-\frac{5}{3}+\frac{3}{2}}} = \frac{4}{3}a^{-1} = \frac{4}{3}X\frac{1}{4} = \frac{1}{3}$$

(31) Ans. c
Explanation:

$x^{(a+b)(a^2+ab+b^2)} x^{(b+c)(b^2-bc+c^2)} x^{(b^2-bc+c^2)} x^{(c+a)(c^2-ac+a^2)}$

$= x^{a^3+b^3} . x^{b^3+c^3} . x^{c^3+a^3}$

$= x^{2(a^3+b^3+c^3)}$

(32) Ans. a

Explanation:

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

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

Z =abc

(33) Ans. b

Explanation:

$x^{2a-3} y^{2a} = x^{6-a} y^{5a}$

$x^{3a-9} = y^{3a}$

Taking logarithm

(3a-9)log x = 3a logy

3alogx – 3a logy = 9 logx

$a \log \frac{x}{y} = 3 \log x$

(34) Ans. a

Explanation:

Present value of growing property = $\frac{R}{i-g}$

$= \frac{60}{0.07 - 0.05} = 3000$

(35) Ans. b

Explanation:

No. of such ways = $\frac{(n-1)!}{2}$

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

(36) Ans. a

Explanation:

If (b+c), (c+a),(a+b) are in A.p.

Then 2(c+a) = b+c+a+b

2b = a+c

(37) Ans. c

Explanation:

A = 2 I

A^5 = 32 I

A^5 = 16. 2I
A^5= 16A

(38) Ans. c
Explanation:
${}^nP_r = r! \, {}^nC_r$
2880 = r! X 120
r! = 24
r = 4

(39) Ans. d
Explanation:
fog(x) = f[g(x)]
= f[2x-3]
= $(2x-3)^2+3(2x-3)+1$
= $4x^2-6x+1$
fog(-1) = 4+6+1 = 11

(40) Ans. d
Explanation:
Number of permutations of n distinct objects taken r at a time when a particular object is not taken in any arrangement is ${}^{n-1}p_r$
No. of arrangements = ${}^{14}P_6$

(41) Ans. c

(42) Ans. b

(43) Ans. b

(44) Ans. d

(45) Ans. a

(46) Ans. c

(47) Ans. c

(48) Ans. c

(49) Ans. a

(50) Ans. d

(51) Ans. d

(52) Ans. c

(53) Ans. d

(54) Ans. c

(55) Ans. d

(56) Ans. b

(57) Ans. a

(58) Ans. c

(59) Ans. d

(60) Ans. b

(61) Ans. a
Explanation:
The colour of a flower is an example of An attribute

(62) Ans. b
Explanation:
The data are known to be Secondary if the data, as being already collected, are used by a different person or agency.

(63) Ans. b
Explanation:
Mutually exclusive classification is usually meant for a continuous variable

(64) Ans. c
Explanation:

0-10	15	
10-20	23	
20-30	27	SO=19+16=35
30-40	19	
40-50	16	

(65) Ans. a
Explanation:

$$\bar{\times} = A + \frac{\sum dx}{n}$$

(66) Ans. c
Explanation:

$$New\,Mean = \frac{\bar{\times}}{\alpha} \quad New\,Mean = \frac{\bar{\times}}{\alpha} + 10$$

(67) Ans. d
Explanation:

$$25000 = \frac{n_1 \times 27000 + n_2 \times 17000}{n_1 + n_2} \; SO \;\; n_1 = 80\% \; n_2 = 20\%$$

(68) Ans. b
Explanation:

$$\bar{\times} com = \frac{K\bar{\times} + 10K\bar{y}}{11K} \bar{\times} com = \frac{\bar{\times} + 10\bar{y}}{11}$$

(69) Ans. a
Explanation:
HM is the reciprocal of the AM of reciprocal of observations.

$$H.M = \frac{n}{\frac{1}{a}+\frac{1}{b}+\frac{1}{c}+\frac{1}{n}}$$

(70) Ans. c
Explanation:
Suitable form of average in this case is HM because it used for average rate.

(71) Ans. a
Explanation:
$Q2 - Q1 \Rightarrow Q3 - Q2$

(72) Ans. b
Explanation:

$$D2 = \frac{2(n+1)}{10} th = \frac{n+1}{5} th \;\; So\ it\ is\ 20th\ \ Percentile$$

(73) Ans. b
Explanation:
For ordering shoes of various sizes for resale, mode size will be more appropriate

(74) Ans. a
Explanation:

10 x 2.5 = 25 and marks of passed is 281-25 Avg. is $= \frac{256}{40} \Rightarrow 6.4$

(75) Ans. a
Explanation:

$$\frac{15+25}{2} = 20 \quad SD = \frac{range}{2} = \frac{10}{2} = 5$$

(76) Ans. a
Explanation:
52, 56, 68, 70, 75, 80, 82
Median = 70

X	|X-M|
52	18
56	14

68	2
70	0
75	5
80	10
82	12
	61

$$MD=\frac{61}{7}=8.71428$$

$$MD Coefficient=\frac{8.71428}{70}\times 100$$

(77) Ans. a
Explanation:

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

(78) Ans. c
Explanation:

1, 2, 3, 4.....n SD is $\sqrt{\frac{n^2-1}{12}}$

(79) Ans. b
Explanation:
40 x 100 = 4000-50+40 = $\frac{3990}{100}$ = 39.90

$\bar{x}$=39.90

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

$$5.1=\sqrt{\frac{\sum x^2}{100}-1600}$$

Ex^2 = 162601-2500+1600 = 161701

$$\sigma=\sqrt{\frac{161701}{100}-1592.01}$$

$$\sigma=5$$

(80) Ans. c
Explanation:
If events are mutually exclusive, then both events cannot occur at the same time.

(81) Ans. a
Explanation:

$$P(A^1)=1-P(A)$$

1- 3 / 8
= 5 / 8

(82) Ans. a
Explanation:

$A=\frac{2}{5}$ $A'=\frac{3}{5}$ $B=\frac{7}{10}$ $B'=\frac{3}{10}$

$AB' + BA'$

$\frac{2}{5}\times\frac{3}{10}+7/10\times\frac{3}{5}$ SO $\frac{6}{50}+\frac{21}{50}=\frac{27}{50}$

(83) Ans. a
Explanation:

(2, 3) (3, 2) (1, 4) (4, 1) SO $\frac{4}{36}=\frac{1}{9}$

(84) Ans. a
Explanation:

$\frac{13}{52}\times\frac{12}{51}=\frac{1}{17}$

(85) Ans. c
Explanation:

$\frac{5c_2}{7c_2}=\frac{10}{21}$

(86) Ans. c
Explanation:
P=2
P=2(1-P)
P=2-2P
3P=2
P=2/3
q= $\frac{1}{3}$

$^5C_3\left(\frac{2}{3}\right)^3\left(\frac{1}{3}\right)^2$

$=\frac{80}{243}$

(87) Ans. a
Explanation:

$A=\frac{1}{5}$ $A'=\frac{4}{5}$

(88) Ans. b

Explanation:

X	P	PX
5	1/3	5/3
6	1/4	6/4
7	5/12	35/12

$$\frac{5}{3}+\frac{6}{4}+\frac{35}{12}$$

$$\frac{20+18+35}{12}=6.08$$

(89) Ans. c

Explanation:

X	P	PX
1	1/3	1/3
2	1/3	2/3
3	1/3	3/3

$$\frac{1}{3}+\frac{2}{3}+\frac{3}{3}$$

$$=\frac{6}{3}=2$$

(90) Ans. c

Explanation:

$\beta(n,\rho)$ *is symmetrical when* $\rho=0.5$ *or* $q=0.5$

(91) Ans. b

Explanation:

$$4_{C_0}\ p^0q^4=\frac{16}{81}$$

$$q=\frac{2}{3}\quad p=\frac{1}{3}$$

$$4_{C_4}\left(\frac{1}{3}\right)^4\left(\frac{2}{3}\right)^0=\frac{1}{81}$$

(92) Ans. d

Explanation:

$$m=150\times\frac{2}{100}=3\ \ p(more\,than\,2)=1-\frac{e^{-3}3^0}{0!}-\frac{e^{-3}3^1}{1!}-\frac{e^{-3}3^2}{2!}$$

$$=1-\frac{e^{-3}3^0}{0!}-\frac{e^{-3}3^1}{1!}-\frac{e^{-3}3^2}{2!}=0.58$$

(93) Ans. c

Explanation:
$\mu = 0 \quad \sigma = 1$

(94) Ans. c
Explanation:
The normal curve is symmetrical

(95) Ans. c
Explanation:
Because of the symmetry of Normal distribution the median and the mode have the same value as that of the mean

(96) Ans. c
Explanation :
The symbol $\phi(a)$ indicates the area of the standard normal curve between $-\infty$To a

(97) Ans. d
Explanation:
If X & Y are two independent normal variates with means μ_1& $\mu_2$and standard deviations $\sigma 1$ &$\sigma 2$ respectively, then X + Y follows Means = $\mu_1 + \mu_2$, S.D = $\sqrt{\sigma_1^{\,2} + \sigma_2^{\,2}}$

(98) Ans. b
Explanation:
In semi averages method, we decide the data into two equal parts

(99) Ans. b
Explanation:
Depression in business is cyclical

(100) Ans. b
Explanation:
The multiplicative time series model is Y = T x S x C x I

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