J.K. SHAH CLASSES

MATHEMATICS & STATISTICS

FYJC TERMINAL TEST - 01

DURATION - 2 HR   SOLUTION SET   MARKS - 50

Q1. (A) Attempt ANY **THREE OF** THE FOLLOWING (09)

Q-1A

01. $3x + y = 2;\ kx + 2y = 3\ ;\ \ 2x - y = -3$ are consistent . Find k

SOLUTION

$3x + y = 2$

$kx + 2y = 3$

$2x - y = -3$ are consistent

Hence

$$\begin{array}{ccc} + & - & + \end{array}$$
$$\begin{vmatrix} 3 & 1 & 2 \\ k & 2 & 3 \\ 2 & -1 & -3 \end{vmatrix} = 0$$

$3(-6 + 3) - 1(-3k - 6) + 2(-k - 4) = 0$

$3(-3) + 3k + 6 - 2k - 8 = 0$

$-9 + k - 2 = 0$

$-11 + k = 0$

$k = 11$

02. If A.M. of two numbers exceeds their G.M. by 15 and their H.M. by 27 , find the numbers

SOLUTION

$A - G = 15 \quad \therefore\ G = A - 15 \ \ldots\ldots (1)$

$A - H = 27 \quad \therefore\ H = A - 27 \ \ldots\ldots (2)$

$G^2 = AH$

$(A - 15)^2 = A(A - 27)$

$A^2 - 30A + 225 = A^2 - 27A$

$225 = 3A$

$75 = A$

SUBS IN (1)

$G = 75 - 15 = 60$

NOW ;

$A = 75$	$G = 60$
$\frac{a+b}{2} = 75$	$G^2 = 3600$
$a + b = 150$ ..... (3)	$ab = 3600$ .... (4)

Solving

$a(150 - a) = 3600$

$150a - a^2 = 3600$

$a^2 - 150a + 3600 = 0$

$a^2 - 120a - 30a + 3600 = 0$

$a(a - 120) - 30(a - 120) = 0$

$(a - 30)(a - 120) = 0$

$a = 30 \quad ; \quad a = 120$

subs in (3)

$b = 120 \quad ; \quad b = 30$ ans : 30, 120

03. in G.P. $t_4 = 24$; $t_9 = 768$. Find S_8

SOLUTION

$t_4 = 24 \therefore ar^3 = 24$ ...... (1)

$t_9 = 972 \therefore ar^8 = 768$ ...... (2)

$\frac{ar^8}{ar^3} = \frac{768}{24}$

$r^5 = 32$

$r = 2$

subs in (1)

$a(2)^3 = 24$

$a.8 = 24$

$a = 3$

Now

$a = 3 ; \quad r = 2 ; n = 8$

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

$$S_5 = \frac{3(2^8 - 1)}{2 - 1}$$

$$= 3(256 - 1)$$

$$= 3(255)$$

$$= 765$$

04. If for a sequence , $S_n = 2n^2 + 5n$, find t_n and show that the sequence is an A.P.

SOLUTION

$$t_n = S_n - S_{n-1}$$

$$= 2n^2 + 5n - [2(n - 1)^2 + 5(n - 1)]$$

$$= 2n^2 + 5n - [2(n^2 - 2n + 1) + 5n - 5]$$

$$= 2n^2 + 5n - [2n^2 - 4n + 2 + 5n - 5]$$

$$= 2n^2 + 5n - [2n^2 + n - 3]$$

$$= 2n^2 + 5n - 2n^2 - n + 3$$

$$= 4n + 3$$

$$t_{n-1} = 4(n - 1) + 3$$

$$= 4n - 4 + 3$$

$$= 4n - 1$$

$$t_n - t_{n-1} = 4n + 3 - (4n - 1)$$

$$= 4n + 3 - 4n + 1$$

$$= 4 = \text{constant} \quad \text{Hence AP}$$

(B) Attempt ANY **ONE OF** THE FOLLOWING (04)

01. Prove without expanding as far as possible

$$\begin{vmatrix} a^2+2a & 2a+1 & 1 \\ 2a+1 & a+2 & 1 \\ 3 & 3 & 1 \end{vmatrix} = (a-1)^3$$

Q-1B

SOLUTION

$R_1 - R_2$, $R_2 - R_3$

$$= \begin{vmatrix} a^2-1 & a-1 & 0 \\ 2a-2 & a-1 & 0 \\ 3 & 3 & 1 \end{vmatrix}$$

Taking $(a-1)$ common from R_1 & R_2

$$= (a-1)^2 \begin{vmatrix} a+1 & 1 & 0 \\ 2 & 1 & 0 \\ 3 & 3 & 1 \end{vmatrix}$$

$R_1 - R_2$

$$= (a-1)^2 \begin{vmatrix} a-1 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 3 & 1 \end{vmatrix}$$

Taking $(a-1)$ common from R_1

$$= (a-1)^3 \begin{vmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 3 & 1 \end{vmatrix}$$

Expanding the determinant

$$= (a-1)^3 \left[1(1-0)\right]$$

$$= (a-1)^3$$

02. Prove without expansion

$$\begin{vmatrix} x+y & y+z & z+x \\ z+x & x+y & y+z \\ y+z & z+x & x+y \end{vmatrix} = 2\begin{vmatrix} x & y & z \\ z & x & y \\ y & z & x \end{vmatrix}$$

LHS

$C_1 - C_2$

$$= \begin{vmatrix} x-z & y+z & z+x \\ z-y & x+y & y+z \\ y-x & z+x & x+y \end{vmatrix}$$

$C_1 + C_3$

$$= \begin{vmatrix} 2x & y+z & z+x \\ 2z & x+y & y+z \\ 2y & z+x & x+y \end{vmatrix}$$

Taking '2' common from C_1

$$= 2\begin{vmatrix} x & y+z & z+x \\ z & x+y & y+z \\ y & z+x & x+y \end{vmatrix}$$

$C_3 - C_1$

$$= 2\begin{vmatrix} x & y+z & z \\ z & x+y & y \\ y & z+x & x \end{vmatrix}$$

$C_2 - C_3$

$$= 2\begin{vmatrix} x & y & z \\ z & x & y \\ y & z & x \end{vmatrix} = \text{RHS}$$

Q2. (A) Attempt ANY **TWO OF** THE FOLLOWING (06)

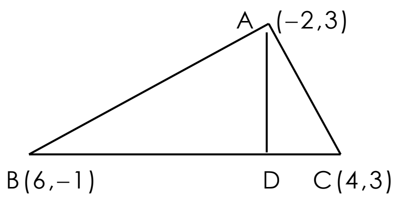
01. Find the coordinates of the orthocenter of a triangle whose vertices are

$(-2,3)$, $(6,-1)$, $(4,3)$

Q-2A

SOLUTION

ALTITUDE AD



$m_{BC} = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{3+1}{4-6} = \dfrac{4}{-2} = -2$

AD

$m = \dfrac{1}{2}$ (AD $\perp$ BC) , A$(-2,3)$

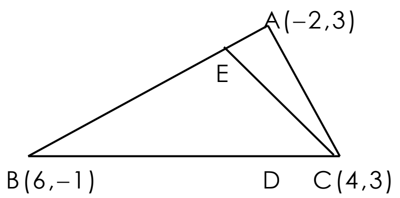
$y - y_1 = m(x - x_1)$

$y - 3 = \dfrac{1}{2}(x + 2)$

$2y - 6 = x + 2$

$x - 2y = -8$

ALTITUDE CE



$m_{AB} = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{3+1}{-2-6} = \dfrac{4}{-8} = -\dfrac{1}{2}$

CE

$m = 2$ (CE $\perp$ AB) , C$(4,3)$

$y - y_1 = m(x - x_1)$

$y - 3 = 2(x - 4)$

$y - 3 = 2x - 8$

$2x - y = 5$

ORTHOCENTER 'H'

$x - 2y = -8$

$2x - y = 5 \quad \times 2$

$$\begin{array}{rcl} x - 2y & = & -8 \\ 4x - 2y & = & 10 \\ -\quad + & & - \\ \hline -3x & = & -18 \end{array}$$

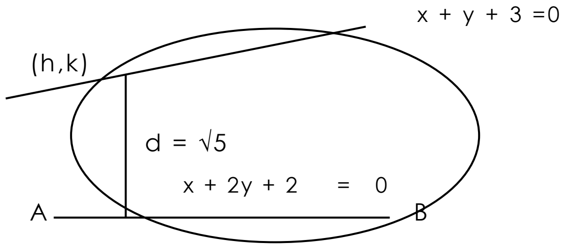
$x = 6$

subs in (1)

$y = 7$ H $(6,7)$

02. Find points on the line $x + y + 3 = 0$ whose distance from $x + 2y + 2 = 0$ is $\sqrt{5}$ units

SOLUTION



STEP 1 :

Since (h,k) lies on $x + y + 3 = 0$, it must satisfy the equation

$$\therefore h + k = -3 \quad \ldots\ldots (1)$$

STEP 2 :

$$d = \sqrt{5}$$

$$\left|\frac{h + 2k + 2}{\sqrt{1^2 + 2^2}}\right| = \sqrt{5}$$

$$\frac{h + 2k + 2}{\sqrt{5}} = \pm\sqrt{5}$$

$$h + 2k + 2 = \pm 5$$

$h + 2k + 2 = 5$	$h + 2k + 2 = -5$
$h + 2k = 3 \;\ldots. (2)$	$h + 2k = -7 \;\ldots. (3)$
Solving (1) & (2)	Solving (1) & (3)
$h + k = -3$	$h + k = -3$
$-\;\; h \underset{-}{+} 2k = \underset{-}{\;} 3$	$-\;\; h \underset{-}{+} 2k = \underset{+}{-}7$
$-k = -6$	$-k = 4$
$k = 6$	$k = -4$
$h + 6 = -3$	$h - 4 = -3$
$h = -9$	$h = 1$
$(-9 , 6)$	$(1,-4)$

03. if the acute angle between the lines $4x - y + 7 = 0$ and $kx - 5y - 9 = 0$ is 45^o , find k

SOLUTION

$$4x - y + 7 = 0 \;;\quad m_1 = -\frac{a}{b} = -\frac{4}{-1} = 4$$

$$kx - 5y - 9 = 0 \;;\quad m_2 = -\frac{a}{b} = \frac{-k}{-5} = \frac{k}{5}$$

$$\tan\theta = \left|\frac{m_1 - m_2}{1 + m_1.m_2}\right|$$

$$\tan 45 = \left|\frac{4 - \frac{k}{5}}{1 + \frac{4k}{5}}\right|$$

$$1 = \left|\frac{20 - k}{5 + 4k}\right|$$

$\frac{20-k}{5+4k} = 1$	$\frac{20-k}{5+4k} = -1$
$20 - k = 5 + 4k$	$20 - k = -5 - 4k$
$15 = 5k$	$3k = -25$
$k = 3$	$k = -25/3$

(B) Attempt ANY **TWO OF** THE FOLLOWING (06)

01. if $\cos\theta = -3/5$; $\pi < \theta < 3\pi/2$. find $\dfrac{\operatorname{cosec}\theta + \cot\theta}{\sec\theta - \tan\theta}$

Q-2B

SOLUTION

θ lies in the III Quadrant

$\therefore$ $\tan\theta$ & $\cot\theta$ are positive

$$\boxed{\cos\theta = -\frac{3}{5} \quad ; \quad \sec\theta = -\frac{5}{3}}$$

$$\sin^2\theta + \cos^2\theta = 1$$

$$\sin^2\theta + \frac{9}{25} = 1$$

$$\sin^2\theta = 1 - \frac{9}{25}$$

$$\sin^2\theta = \frac{16}{25}$$

$$\boxed{\sin\theta = -\frac{4}{5} \quad ; \quad \operatorname{cosec}\theta = -\frac{5}{4}}$$

$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$

$$= \frac{-4/5}{3/5}$$

$$\boxed{\tan\theta = \frac{4}{3} \quad ; \quad \cot\theta = \frac{3}{4}}$$

NOW $\dfrac{\operatorname{cosec}\theta + \cot\theta}{\sec\theta - \tan\theta}$

$$= \frac{-\frac{5}{4} + \frac{3}{4}}{-\frac{5}{3} - \frac{4}{3}}$$

$$= \frac{-\frac{2}{4}}{-\frac{9}{3}} = \frac{\frac{1}{2}}{3} = \frac{1}{6}$$

02. Prove : $\sin A . \sin(B - C) + \sin B . \sin(C - A) + \sin C . \sin(A - B) = 0$

LHS

$\sin A . \sin(B - C)$

$= \sin A . (\sin B \cos C - \cos B \sin C)$

$= \sin A.\sin B.\cos C - \sin A.\cos B.\sin C$

$\sin B . \sin(C - A)$

$= \sin B . (\sin C \cos A - \cos C \sin A)$

$= \sin B.\sin C.\cos A - \sin B.\cos C.\sin A$

$= \cos A.\sin B.\sin C - \sin A .\sin B.\cos C$

$\sin C . \sin(A - B)$

$= \sin C . (\sin A \cos B - \cos A \sin B)$

$= \sin C.\sin A.\cos B - \sin C.\cos A.\sin B$

$= \sin A.\cos B \sin C - \cos A.\sin B \sin C$

LHS $= \sin A . \sin(B - C) + \sin B . \sin(C - A) + \sin C . \sin(A - B)$

$= \sin A.\sin B.\cos C - \sin A.\cos B.\sin C + \cos A.\sin B.\sin C - \sin A .\sin B.\cos C$
$\quad + \sin A.\cos B \sin C - \cos A.\sin B \sin C$

$= 0$

03. Prove : $\tan 54^\circ = \tan 36^\circ + 2 \tan 18^\circ$

SOLUTION

$\tan 54^\circ = \tan(36 + 18)$

$$\tan 54^\circ = \frac{\tan 36^\circ + \tan 18^\circ}{1 - \tan 36^\circ.\tan 18^\circ}$$

$\tan54 - \tan 54.\tan36.\tan18 = \tan36 + \tan18$

$\tan54 - \tan(90-36).\tan36.\tan18 = \tan36 + \tan18$

$\tan54 - \cot 36 . \tan36 . \tan18 = \tan36 + \tan18$

$\tan 54^\circ - \tan18^\circ = \tan 36^\circ + \tan18^\circ$

$\tan 54^\circ = \tan 36^\circ + 2\tan 18^\circ$.

Q3. (A) Attempt ANY **ONE OF** THE FOLLOWING (04)

01. 7 persons sit in a row . Find the total number of seating arrangements if
   a) 3 persons A , B ,C sit together in particular order
   b) A , B and C sit together in any order
   c) A and B occupy the end seats

Q-3A

SOLUTION

a) 3 persons A , B ,C sit together in particular order

Consider A , B , C as 1 set

1 set of A , B , C & 4 others can be arranged in $^5P_5$ = 5! ways

Having done that ;

Since A, B , C sit together in a particular order , they cannot be further arranged

By fundamental principle of Multiplication

Total arrangements = 5! = 120

b) A , B and C sit together in any order

Consider A , B , C as 1 set

1 set of A , B , C & 4 others can be arranged in $^5P_5$ = 5! ways

Having done that ;

A, B , C can then be arranged among themselves in $^3P_3$ = 3! ways

By fundamental principle of Multiplication

Total arrangements = 5! x 3!

= 120 x 6 = 720

c) A and B occupy the end seats

A and B can be arranged onto the end seats in $^2P_2$ = 2! ways

Having done that ;

5 others can then be arranged among themselves in $^5P_5$ = 5! ways

By fundamental principle of Multiplication

Total arrangements = 2! x 5!

= 2 x 120 = 240

02. how many even numbers of four digits can be formed using digits 0 , 1 , 2 , 3 & 4 if no digit being used more than once

SOLUTION

Step 1 : 4 – digit numbers formed

Thousand place can be filled by any one of the 4 digits ('0' excluded) in 4 ways

Having done that , remaining 3 places can be filled by any 3 of remaining 4 digits in $^4P_3$ ways

By fundamental principle of Multipliation ,

Total Numbers formed $= 4 \times {}^4P_3 = 4 \times 4 \times 3 \times 2 = 96$

Step 2 : Odd Numbers

Unit place can be filled by any one of digits 1 , 3 in $^2P_1$ ways

Having done that ,

Thousand place can be filled by any one the remaining 3 digits ('0' excluded) in $^3P_1$ ways

Having done that , remaining 2 places can be filled by any 2 of remaining 3 digits in $^3P_2$ ways

By fundamental principle of Multipliation ,

No. of Odd Numbers formed $= {}^2P_1 \times {}^3P_1 \times {}^3P_2 = 2 \times 3 \times 3 \times 2 = 36$

Hence

No. of Even numbers formed $= 96 - 36 = 60$

(B) Attempt ANY **THREE OF** THE FOLLOWING (09)

01. From the following data , find the percentage of workers who are weighing more than 68 kgs

Weight (in kg):	50 – 55	55 – 60	60 – 65	65 – 70	70 – 75
No. of worker :	15	18	30	25	12

Q-3B

SOLUTION :

CI	f	cf
50 – 55	15	15
55 – 60	18	33
60 – 65	30	63
65 – 70	25	88 ←
70 – 75	12	100

let nth worker weigh 68 kg. This worker is in class 65 – 70

$$68 = 65 + \frac{n - 63}{25}(70 - 65)$$

$$3 = \frac{n - 63}{25}.(5)$$

$$3 = \frac{n - 63}{5}$$

$$15 = n - 63 \qquad \therefore n = 78$$

78^{th} worker weighs 68 kgs

$\therefore$ No. of workers weighing more than 68kgs = 100 – 78 = 22

$\therefore$ Percentage of workers weighing more than 68kgs $= \frac{22}{100} \times 100 = 22\%$

02.

Monthly Bal. less than	1000	900	800	700	600	500	400	300	200
No of A/c holder	500	498	480	475	440	374	300	125	25

Find the 7^{th} decile

SOLUTION :

CI	f	cf	
100 – 200	25	25	
200 – 300	100	125	
300 – 400	175	300	
400 – 500	74	374	D_7 class
500 – 600	66	440	
600 – 700	35	745	
700 – 800	5	480	
800 – 900	18	498	
900 – 1000	2	500	

$$d_7 = 7\frac{N}{10} = \frac{7(500)}{10} = 350$$

$$D_7 = L_1 + \frac{d_7 - c}{f}(L_2 - L_1)$$

$$= 400 + \frac{350 - 300}{74}(500 - 400)$$

$$= 400 + \frac{50}{74}(100)$$

$$= 400 + 0.675\ (100)$$

$$= 467.5\ (Rs)$$

03. Solve : $\log_3 x + \log_9 x + \log_{243} x = 34/5$

SOLUTION

$$\frac{\log x}{\log 3} + \frac{\log x}{\log 9} + \frac{\log x}{\log 243} = \frac{34}{5}$$

$$\frac{\log x}{\log 3} + \frac{\log x}{\log 3^2} + \frac{\log x}{\log 3^5} = \frac{34}{5}$$

$$\frac{\log x}{\log 3} + \frac{\log x}{2 \log 3} + \frac{\log x}{5 \log 3} = \frac{34}{5}$$

$$\left(\frac{\log x}{\log 3}\ \frac{1}{} + \frac{1}{2}\right) + \frac{1}{5} = \frac{34}{5}$$

$$\frac{\log x}{\log 3}\left(\frac{10 + 5 + 2}{10}\right) = \frac{34}{5}$$

$$\frac{\log x}{\log 3}\left(\frac{17}{10}\right) = \frac{34}{5}$$

$$\frac{\log x}{\log 3} = 4$$

$$\log x = 4 \log 3$$

$$\log x = \log 3^4$$

$$x = 81$$

04. if $a^2 - 12ab + 4b^2 = 0$; Prove $\log(a + 2b) = \frac{1}{2}(\log a + \log b) + 2\log 2$

SOLUTION :

$a^2 - 12ab + 4b^2 = 0$

$a^2 + 4b^2 = 12ab$

ADDING '+4ab' ON BOTH SIDES

$a^2 + 4ab + b^2 = 12ab + 4ab$

$(a + 2b)^2 = 16ab$

INSERTING LOG ON BOTH SIDES

$\log (a + 2b)^2 = \log 16ab$

$2\log (a + 2b) = \log 16 + \log a + \log b$

$2\log (a + 2b) = \log 2^4 + \log a + \log b$

$2\log (a + 2b) = 4\log 2 + \log a + \log b$

$\log (a + 2b) = \frac{4\log 2 + \log a + \log b}{2}$

$\log (a + 2b) = \frac{4\log 2}{2} + \frac{1}{2}(\log a + \log b)$

$\log (a + 2b) = 2\log 2 + \frac{1}{2}(\log a + \log b)$

.... PROVED

Q4. (A) Attempt ANY **TWO OF** THE FOLLOWING **Q-4A** (06)

01. Find coefficient of variation for the following data : 10 ; 20 ; 18 ; 12 ; 15

STEP 1 :

x	$x-\bar{x}$	$(x-\bar{x})^2$
10	−5	25
20	5	25
18	3	9
12	−3	9
15	0	0
75		68

$$\bar{x} = \frac{\sum x}{n} = \frac{75}{5} = 15$$

STEP 2 :

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

$$= \sqrt{\frac{68}{5}} = \sqrt{13.6}$$

taking log on both sides

$$\log \sigma = \frac{1}{2}(\log 13.6)$$

$$= \frac{1}{2}(1.1335)$$

$$= \frac{1.1335}{2}$$

$$\log \sigma = 0.5668$$

$$\sigma = AL(0.5668)$$

$$= 3.689$$

STEP 3 :

$$CV = \frac{\sigma}{\bar{x}} \times 100$$

$$= \frac{3.689}{15} \times 100$$

$$= \frac{368.9}{15}$$

$$= 24.59\%$$

02. Bowley's coefficient of skewness is 0.6 . The sum of upper and lower quartiles is 100 and the median is 38 . Find the upper and lower quartiles

$Q_3 + Q_1 = 100$; $M = 38$; $SK_B = 0.6$

$$SK_B = \frac{(Q_3 - Q_2) - (Q_2 - Q_1)}{(Q_3 - Q_2) + (Q_2 - Q_1)}$$

$$SK_B = \frac{Q_3 + Q_1 - 2M}{Q_3 - Q_1}$$

$$0.6 = \frac{100 - 2(38)}{Q_3 - Q_1}$$

$$Q_3 - Q_1 = \frac{100 - 76}{0.6}$$

$$Q_3 - Q_1 = \frac{24}{0.6} = \frac{240}{6} = 40$$

Now $Q_3 + Q_1 = 100$

$Q_3 - Q_1 = 40$

$2\,Q_3 = 140$

$Q_3 = 70$

Subs in

$Q_3 + Q_1 = 100$

$70 + Q_1 = 100$

$Q_1 = 30$

03.

in a series of 5 observations , the value of mean and variance is 3 and 2 . If three observations are 1 , 3 & 5 find the remaining two

let the other 2 observations be a & b

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

$$3 = \frac{1+3+5+a+b}{5}$$

$$15 = 9 + a + b$$

$$a + b = 6$$

$$\therefore b = 6 - a \quad \ldots\ldots (1)$$

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

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

$$2 = \frac{1+9+25+a^2+b^2}{5} - 3^2$$

$$2 = \frac{35+a^2+b^2}{5} - 9$$

$$11 = \frac{35+a^2+b^2}{5}$$

$$55 = 35 + a^2 + b^2$$

$$a^2 + b^2 = 20$$

$a^2 + (6-a)^2 = 20$ from (1)

$$a^2 + 36 - 12a + a^2 = 20$$

$$2a^2 - 12a + 16 = 0$$

$$a^2 - 6a + 8 = 0$$

$a = 4$	$a = 2$
$b = 6 - a$	$b = 6 - a$
$b = 2$	$b = 4$

$\therefore$ the other two observations are 2 & 4

(B) Attempt ANY **TWO OF** THE FOLLOWING (06)

Q-4B

01. for moderately skewed distribution mean = 40 ; Karl Pearson's coefficient of skewness is 0.1 & coeff. of variation is 20% . Find mode

STEP 1 : SD

$$CV = \frac{\sigma}{\bar{x}} \times 100$$

$$20 = \frac{\sigma}{40} \times 100$$

$$\sigma = 8$$

STEP 2 : MODE

$$Skp = \frac{Mean - Mode}{\sigma}$$

$$0.1 = \frac{40 - Mode}{8}$$

$$0.8 = 40 - Mode$$

$$Mode = 40 - 0.8$$

$$Mode = 39.2$$

STEP 3 : MEDIAN

Mean – mode = 3(mean - median)

40 – 39.2 = 3(40 – median)

0.8 = 3(40 – median)

0.27 = 40 – median

median = 40 – 0.27 = 39.73

02. $^{11}P_{(r-1)} : {}^{12}P_{(r-2)} = 14 : 3$. Find r

SOLUTION

$$\frac{^{11}P_{r-1}}{^{12}P_{r-2}} = \frac{1}{14}$$

$$\frac{\frac{11!}{(11-r+1)!}}{\frac{12!}{(12-r+2)!}} = \frac{1}{14}$$

$$\frac{\frac{11!}{(12-r)!}}{\frac{12!}{(14-r)!}} = \frac{1}{14}$$

$$\frac{11!}{(12-r)!} \times \frac{(14-r)!}{12!} = \frac{1}{14}$$

$$\frac{11!}{12!} \times \frac{(14-r)!}{(12-r)!} = \frac{1}{14}$$

$$\frac{11! \times}{12.11!} \frac{(14-r)(13-r)\ (12-r)!}{(12-r)!} = \frac{1}{14}$$

$$\frac{1}{(n+3)(n-2)} = \frac{1}{14}$$

$$(n+3)(n-2) = 14$$

$$(n+3)(n-2) = 7.2$$

On Comparing ;

$n + 3 = 7$

$n = 7 - 3 = 4$

03. the first three moments about 4 are 1 , 4 and 10 respectively . Find the coefficient of skewness γ_1

$A = 4$, $\mu_1(a) = 1$, $\mu_2(a) = 4$, $\mu_3(a) = 10$

$\mu_1 = 0$

$$\mu_2 = \mu_2(a) - \mu_1(a)^2$$
$$= 4 - 1$$
$$= 3$$

$$\mu_3 = \mu_3(a) - 3\mu_1(a)\ \mu_2(a) + 2\mu_1(a)^3$$
$$= 10 - 3(1)(4) + 2(1)$$
$$= 10 - 12 + 2$$
$$= 0$$

$$\beta_1 = \frac{\mu_3^2}{\mu_2^3}$$
$$= \frac{0}{27}$$
$$= 0$$

$$\gamma_1 = \sqrt{\beta_1} = 0$$

All The Best for next exam , don't miss it

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