JEE Main 2020 Paper

Date : 6th September 2020

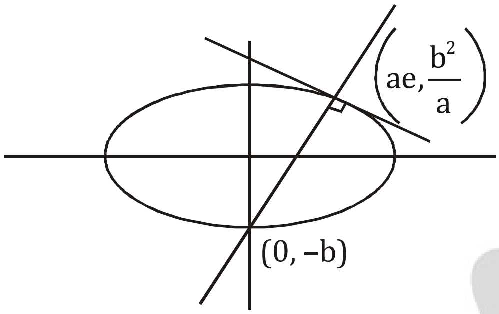
Time : 02 : 00 pm - 05 : 00 pm

Subject : Maths

Q.1 If the normal at an end of a latus rectum of an ellipse passes through an extremity of the minor axis, then the eccentricity e of the ellipse satisfies:

(1) $e^4+2e^2-1=0$ (2) $e^2+2e-1=0$ (3) $e^4+e^2-1=0$ (4) $e^2+e-1=0$

Sol. **(3)**



Equation of normal at $\left(ae, \dfrac{b^2}{a}\right)$

$$\frac{a^2x}{ae} - \frac{b^2y}{\frac{b^2}{a}} = a^2e^2$$

$$\frac{ax}{e} - ay = a^2e^2 \Rightarrow \frac{x}{e} - y = ae^2$$

It passes through (0,–b)

$$-b = ae^2 \Rightarrow b^2 = a^2e^4$$

$$a^2\left(1-e^2\right) = a^2e^4$$

$\Rightarrow$ $e^4 + e^2 - 1 = 0$

Q.2 The set of all real values of λ for which the function $f(x) = (1-\cos^2 x).(\lambda + \sin x)$, $x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$, has exactly one maxima and exactly one minima, is:

(1) $\left(-\frac{3}{2}, \frac{3}{2}\right) - \{0\}$ (2) $\left(-\frac{1}{2}, \frac{1}{2}\right) - \{0\}$ (3) $\left(-\frac{3}{2}, \frac{3}{2}\right)$ (4) $\left(-\frac{1}{2}, \frac{1}{2}\right)$

Sol. **(1)**

f(x) = (1− cos²x) (λ + sinx)

f(x) = sin²x (λ + sinx)

f′(x) = 2sinx cosx (λ +sinx) + sin²x (cosx)

= sin2x $\left(\lambda+\sin x+\frac{\sin x}{2}\right)$

= sin2x $\left(2\lambda+3\sin x\right)$

For extreme value f′(x) = 0

Sin2x = 0 $\Rightarrow$ sinx = 0 $\Rightarrow$ x = 0 $\rightarrow$ One point

2λ + 3sinx = 0

$\Rightarrow$ sinx = $\frac{-2\lambda}{3}$

sinx $\in$ (−1,1) − $\{0\}$

−1 < $\frac{-2\lambda}{3}$ < 1 $\Rightarrow$ $\frac{-3}{2}<\lambda<\frac{3}{2}$

$\lambda \in \left(\frac{-3}{2},\frac{3}{2}\right)-\{0\}$

Q.3 The probabilities of three events A, B and C are given by P(A)=0.6, P(B)=0.4 and P(C)=0.5. If $P(A\cup B)=0.8$, $P(A\cap C)=0.3$, $P(A\cap B\cap C)=0.2$, $P(B\cap C)=\beta$ and $P(A\cup B\cup C)=\alpha$, where $0.85\le\alpha\le 0.95$, then β lies in the interval:

(1) [0.36,0.40] (2) [0.25,0.35] (3) [0.35,0.36] (4) [0.20,0.25]

Sol. **(2)**

P(A$\cup$BUC) = P(A) + P(B) + P(C) − P(A$\cap$B) − P(B$\cap$C) −P(C$\cap$A) + P(A$\cap$B$\cap$C)

α = 0.6 + 0.4 + 0.5 −P(A$\cap$B) −β −0.3 + 0.2

α = 1.4 − P(A$\cap$B) −β $\Rightarrow$ α + β = 1.4 − P(A$\cap$B) ....(1)

again

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

0.8 = 0.6 + 0.4 − P(A$\cap$B)

P(A$\cap$B) = 0.2 ....(2)

Put the value P(A$\cap$B) in equation (1)

α + β = 1.2

α = 1.2 − β

0.85 $\le$ α $\le$0.95 $\Rightarrow$ 0.85 $\le$ 1.2 − β $\le$0.95

$\beta \in$ [0.25, 0.35]

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Q.4 The common difference of the A.P. $b_1, b_2, \ldots\ldots b_m$ is 2 more than the common difference of A.P. $a_1, a_2, \ldots a_n$. If $a_{40} = -159$, $a_{100} = -399$ and $b_{100} = a_{70}$, then b_1 is equal to:

(1) -127 (2) 81 (3) 127 (4) -81

Sol. **(4)**

A.P $(a_1, a_2, a_3 \ldots\ldots\ldots a_n)$ (CD = D_a)

$(b_1, b_2, b_3 \ldots\ldots\ldots b_m)$ (CD = D_b)

$D_b = D_a + 2$

$a_{40} = -159$

$a_1 + 39 D_a = -159$ ----(1)

$a_{100} = -399$

$a_1 + 99 D_a = -399$ ----(2)

Eqn (1) – (2)

$-60 D_a = 240 \Rightarrow D_a = -4$

$D_b = -4 + 2 = -2$

$a_1 + 39(-4) = -159 \Rightarrow a_1 = -3$

$b_{100} = a_{70}$

$b_1 + 99 D_b = a_1 + 69 D_a$

$b_1 + 99(-2) = (-3) + 69(-4)$

$b_1 = -81$

Q.5 The integral $\int_1^2 e^x . x^x (2 + \log_e x) dx$ equal :

(1) $e(4e-1)$ (2) $e(4e+1)$ (3) $4e^2-1$ (4) $e(2e-1)$

Sol. **(1)**

$$\int_1^2 e^x . x^x \ (2 + \ln x)\, dx$$

$e^x . x^x = t$ $\because$ Upper Limt = $e^2.2^2$, Lower Limit = e

$(e^x.x^x + e^x x^x(1+\ln x))\, dx = dt$

$e^x . x^x (2 + \ln x)\, dx = dt$

$$\int_e^{4.e^2} dt = [t]_e^{4.e^2} = 4.e^2 - e = e(4e-1)$$

Q.6 If the tangent to the curve, $y = f(x) = x\log_e x$, $(x>0)$ at a point $(c, f(c))$ is parallel to the line-segment joining the points (1,0) and (e,e), then c is equal to:

(1) $e^{\left(\frac{1}{1-e}\right)}$ (2) $\frac{e-1}{e}$ (3) $\frac{1}{e-1}$ (4) $e^{\left(\frac{1}{e-1}\right)}$

Sol. **(4)**

$y = f(x) = x \ln x$

$$m_1 = \frac{dy}{dx}\bigg|_{(c, f(c))} = (\ln x + 1)\bigg|_{(c, f(c))} = \ln c + 1$$

slope of the line joining (1, 0), (e, e)

$$m_2 = \left(\frac{e}{e-1}\right)$$

$$m_2 = m_1 \Rightarrow \ln c + 1 = \frac{e}{e-1}$$

$$\ln c = \frac{e}{e-1} - 1 = \frac{1}{e-1}$$

$$\boxed{c = e^{\left(\frac{1}{e-1}\right)}}$$

Q.7 If $y=\left(\frac{2}{\pi}x-1\right)$ cosec x is the solution of the differential equation,

$\frac{dy}{dx}+p(x)y=\frac{2}{\pi}\text{cosec}\,x, 0<x<\frac{\pi}{2}$, then the function p(x) is equal to:

(1) cosec x (2) cot x (3) tan x (4) sec x

Sol. **2**

$$y=\left(\frac{2}{\pi}x-1\right)\text{cosec } x$$

Differentiate w.r.t. x

$$\frac{dy}{dx}=\frac{2}{\pi}\text{ cosec } x-\left(\frac{2x}{\pi}-1\right)\text{cosec } x\text{ . cot } x$$

$$\frac{dy}{dx}+\left(\frac{2x}{\pi}-1\right)\text{cosec } x\text{ . cot } x=\frac{2}{\pi}\text{ cosec } x$$

$$\frac{dy}{dx}+y\text{ cot } x=\frac{2}{\pi}\text{ cosec } x$$

Compare this differential equation with given differential equation

p(x) = cot x

Q.8 If α and β are the roots of the equation 2x(2x+1)=1, then β is equal to:

(1) $2\alpha(\alpha-1)$ (2) $-2\alpha(\alpha+1)$ (3) $2\alpha^2$ (4) $2\alpha(\alpha+1)$

Sol. **(2)**

2x(2x+1) = 1

If α & β are the roots i.e α & β satisy this equation

$$2\alpha(2\alpha+1)=1 \Rightarrow \alpha(2\alpha+1)=\frac{1}{2}$$

$$4x^2+2x-1=0$$

$$\alpha+\beta=\frac{-1}{2}=-\alpha(2\alpha+1)$$

$$\beta=-\alpha(2\alpha+1)-\alpha=-\alpha(2\alpha+2)=-2\alpha(\alpha+1)$$

Q.9 For all twice differentiable functions f: R$\to$R, with f(0)=f(1)=f′(0)=0,

(1) f″(x)=0, at every point $x\in(0,1)$ (2) f″(x)$\neq$0, at every point $x\in(0,1)$

(3) f″(x)=0, for some $x\in(0,1)$ (4) f″(0)=0

Sol. **(3)**

Applying rolle's theorem in [0,1] for function f(x)

f'(c) = 0, c $\in$ (0,1)

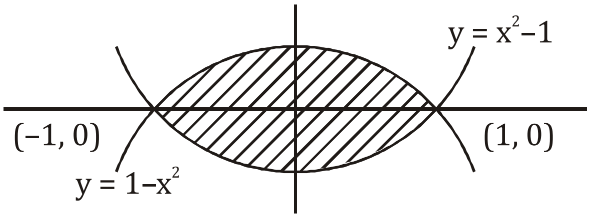
again applying rolles theorem in [0,c] for function f'(x) s

f"(c_1) = 0, $c_1\in(0,c)$

Q.10 The area (in sq.units) of the region enclosed by the curves $y=x^2-1$ and $y=1-x^2$ is equal to :

(1) $\frac{4}{3}$ (2) $\frac{7}{2}$ (3) $\frac{16}{3}$ (4) $\frac{8}{3}$

Sol. **(4)**



Total area = $4\int_0^1 (1-x^2)dx = 4\left[x-\frac{x^3}{3}\right]_0^1$

= $4\left[1-\frac{1}{3}\right]=\frac{8}{3}sq.unit$

Q.11 For a suitably chosen real constant a, let a function, $f:R-\{-a\}\to R$ be defined by $f(x)=\frac{a-x}{a+x}$. Further suppose that for any real number $x \neq -a$ and $f(x) \neq -a$, $(fof)(x)=x$.Then $f\left(-\frac{1}{2}\right)$ is equal to:

(1) –3 (2) 3 (3) $\frac{1}{3}$ (4) $-\frac{1}{3}$

Sol. **(2)**

f(x) = $\frac{a-x}{a+x}$

f(f(x)) = $\frac{a-f(x)}{a+f(x)}=x$

$\frac{a-ax}{1+x}=f(x)=\frac{a-x}{a+x}$

$a\left(\frac{1-x}{1+x}\right)=\frac{a-x}{a+x}$

$\Rightarrow$ a = 1

So f(x) = $\frac{1-x}{1+x}$

$f\left(\frac{-1}{2}\right)=3$

Q.12 Let $\theta = \frac{\pi}{5}$ and $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$. If $B=A+A^4$, then det (B):

(1) is one (2) lies in (1,2) (3) lies in (2,3) (4) is zero

Sol. **(2)**

$A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$

$B = A + A^4$

$A^2 = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$

$= \begin{bmatrix} \cos^2\theta - \sin^2\theta & 2\sin\theta\cos\theta \\ -2\sin\theta\cos\theta & -\sin^2\theta + \cos^2\theta \end{bmatrix}$

$A^2 = \begin{bmatrix} \cos 2\theta & \sin 2\theta \\ -\sin 2\theta & \cos 2\theta \end{bmatrix}$

Simmilarly

$A^4 = \begin{bmatrix} \cos 4\theta & \sin 4\theta \\ -\sin 4\theta & \cos 4\theta \end{bmatrix}$

$B = A^4 + A = \begin{bmatrix} \cos 4\theta & \sin 4\theta \\ -\sin 4\theta & \cos 4\theta \end{bmatrix} + \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$

$B = A^4 + A = \begin{bmatrix} \cos 4\theta + \cos\theta & \sin 4\theta + \sin\theta \\ -\sin 4\theta - \sin\theta & \cos 4\theta + \cos\theta \end{bmatrix}$

$B = (\cos4\theta + \cos\theta)^2 + (\sin4\theta + \sin\theta)^2$

$= \cos^24\theta + \cos^2\theta + 2\cos4\theta \cos\theta$

$+ \sin^24\theta + \sin^2\theta + 2 \sin4\theta -\sin\theta$

$= 2 + 2 (\cos4\theta \cos\theta + \sin4\theta \sin\theta)$

$= 2 + 2 \cos3\theta$

at $\theta = \frac{\pi}{5}$

$|B| = 2 + 2 \cos \frac{3\pi}{5} = 2- (1\text{-}\sin18)$

$|B| = 2\left(1-\frac{\sqrt{5}-1}{4}\right) = 2\left(\frac{5-\sqrt{5}}{4}\right) = \frac{5-\sqrt{5}}{2}$

Q.13 The centre of the circle passing through the point (0,1) and touching the parabola $y=x^2$ at the point (2,4) is :

(1) $\left(\frac{3}{10}, \frac{16}{5}\right)$ (2) $\left(\frac{6}{5}, \frac{53}{10}\right)$ (3) $\left(\frac{-16}{5}, \frac{53}{10}\right)$ (4) $\left(\frac{-53}{10}, \frac{16}{5}\right)$

Sol. **(3)**

Circle passing through point (0,1) and touching curve

$y = x^2$ at (2,4)

tangent at (2,4) is

$$\frac{(y+4)}{2} = x(2)$$

$\Rightarrow y - 4x + 4 = 0$

Equation of circle

$(x-2)^2 + (y-4)^2 + \lambda(4x-y-4) = 0$

Passing through (0,1)

$4 + 9 + \lambda(-5) = 0$

$\lambda = \frac{13}{5}$

Circle is

$$x^2-4x + 4 + y^2 - 8y + 16 + \frac{13}{5}[4x - y - 4] = 0$$

$$x^2 + y^2 + \left(\frac{52}{5} - 4\right) x - \left(8 + \frac{13}{5}\right) y + 20 - \frac{52}{5} = 0$$

$$x^2 + y^2 + \frac{32}{5} x - \frac{53}{5} y + \frac{48}{5} = 0$$

Centre is $\left(-\frac{16}{5}, \frac{53}{10}\right)$

Q.14 A plane P meets the coordinate axes at A, B and C respectively. The centroid of ΔABC is given to be (1,1,2). Then the equation of the line through this centroid and perpendicular to the plane P is:

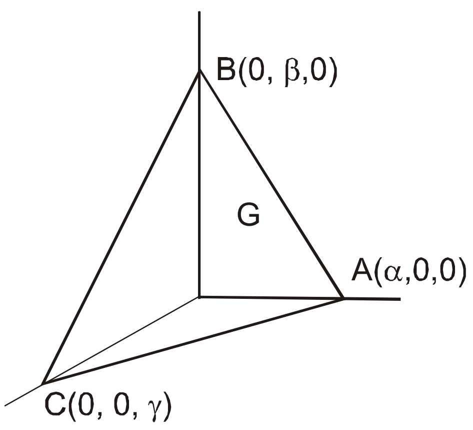
(1) $\frac{x-1}{2} = \frac{y-1}{1} = \frac{z-2}{1}$

(2) $\frac{x-1}{2} = \frac{y-1}{2} = \frac{z-2}{1}$

(3) $\frac{x-1}{1} = \frac{y-1}{2} = \frac{z-2}{2}$

(4) $\frac{x-1}{1} = \frac{y-1}{1} = \frac{z-2}{2}$

Sol. **(2)**



$G = \left(\frac{\alpha}{3}, \frac{\beta}{3}, \frac{\gamma}{3}\right) = (1, 1, 2)$

$\alpha = 3, \beta = 3, \gamma = 6$

Equation of plane is

$\frac{x}{\alpha} + \frac{y}{\beta} + \frac{z}{\gamma} = 1$

$\frac{x}{3} + \frac{y}{3} + \frac{z}{6} = 1$

$2x + 2y + z = 6$

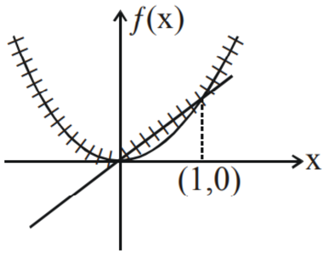
Required line perpendicular to plane is $\frac{x-1}{2} = \frac{y-1}{2} = \frac{z-2}{1}$

Q.15 Let $f : R \to R$ be a function defined by $f(x)=\max\{x,x^2\}$. Let S denote the set of all points in R, where f is not differentiable. Then

(1) $\{0,1\}$ (2) ϕ (an empty set)

(3) $\{1\}$ (4) $\{0\}$

Sol. **(1)**



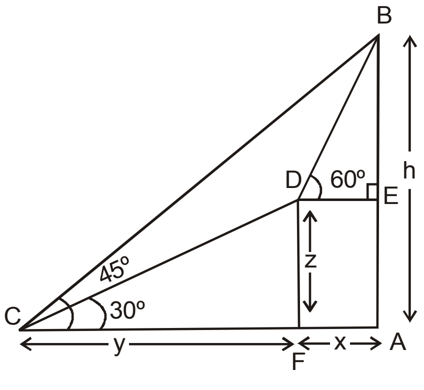
Function is not differentiable at two point

$\{0,1\}$

Q.16 The angle of elevation of the summit of a mountain from a point on the ground is 45°. After climbing up one km towards the summit at an inclination of 30° from the ground, the angle of elevation of the summit is found to be 60°. Then the height (in km) of the summit from the ground is:

(1) $\frac{1}{\sqrt{3}+1}$ (2) $\frac{\sqrt{3}+1}{\sqrt{3}-1}$ (3) $\frac{\sqrt{3}-1}{\sqrt{3}+1}$ (4) $\frac{1}{\sqrt{3}-1}$

Sol. **(4)**



If Δ CDF

$\text{Sin}30° = \frac{z}{1} \Rightarrow z = \frac{1}{2}$ km

$\cos 30° = \frac{y}{1} \Rightarrow y = \frac{\sqrt{3}}{2}$ km

Now in ΔABC

$\tan 45° = \frac{h}{x+y} \Rightarrow h = x + y$

$x = h - \frac{\sqrt{3}}{2}$

Now in ΔBDE

$\tan 60° = \frac{h-z}{x}$

$\sqrt{3}x = h - \frac{1}{2}$

$\sqrt{3}\left(h - \frac{\sqrt{3}}{2}\right) = h - \frac{1}{2} \Rightarrow h = \frac{1}{\sqrt{3}-1}$ km

Q.17 If the constant term in the binomial expansion of $\left(\sqrt{x} - \frac{k}{x^2}\right)^{10}$ is 405, then $|k|$ equals:

(1) 1 (2) 9 (3) 2 (4) 3

Sol. **(4)**

$^{10}C_r \left(\frac{-k}{x^2}\right)^r \left(\sqrt{x}\right)^{10-r}$

$^{10}C_r (-k)^r (x)^{5-\frac{5r}{2}}$

For constant term

$5 - \frac{5r}{2} = 0 \Rightarrow r = 2$

$T_3 = {}^{10}C_2 k^2 = 405$

$k^2 = \frac{405}{45} = \frac{81}{9} = 9$

$|k| = 3$

Q.18 Let $z=x+iy$ be a non-zero complex number such that $z^2 = i|z|^2$, where $i = \sqrt{-1}$, then z lies on the

(1) line, y=x (2) real axis (3) imaginary axis (4) line, y=−x

Sol. **(1)**

z = x + iy

$z^2 = i\,|z|^2$

$x^2 - y^2 + 2i\,x\,y = i(x^2 + y^2)$

equating real terms

$x^2 - y^2 = 0 \Rightarrow x^2 = y^2$

equating imaginary terms

$2xy = x^2 + y^2$

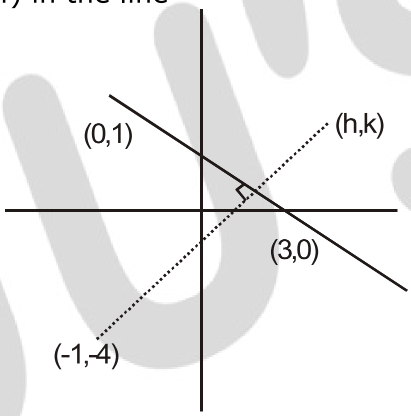
$(x - y)^2 = 0 \Rightarrow x = y$

Q.19 Let L denote the line in the xy-plane with x and y intercepts as 3 and 1 respectively. Then the image of the point (–1, –4) in this line is:

(1) $\left(\frac{11}{5}, \frac{28}{5}\right)$ (2) $\left(\frac{8}{5}, \frac{29}{5}\right)$ (3) $\left(\frac{29}{5}, \frac{11}{5}\right)$ (4) $\left(\frac{29}{5}, \frac{8}{5}\right)$

Sol. **(1)**

Let (h, k) is the image of the point (–1, –4) in the line



$\frac{x}{3} + \frac{y}{1} = 1$

x + 3y = 3

L_2: 3x –y + λ = 0

–3 + 4 + λ = 0

λ =–1

3 x–y = 1

(h,k) satisfy the equation of line L_2

3h –k = 1 ______(1)

$\left|\frac{-1-12-3}{\sqrt{1+9}}\right| = \left|\frac{h+3k-3}{\sqrt{1+9}}\right|$

16 = |h + 3k -3|

h+3k = 19 ______(2)

h + 3k = –13 ______(3)

From equation (2) & (3) put the value of h in equation (1)

h = 19-3k, h = -13-3k

3(19 –3k) –k=1 3(–13–3k) –k=1

$-10k = -56 = \frac{28}{5}$ $-10k = 40 \Rightarrow k = -4$

$k = \frac{28}{5}, h = 19 - 3\left(\frac{28}{5}\right) = \frac{95-84}{5} = \frac{11}{5}$

Image = $\left(\frac{11}{5}, \frac{28}{5}\right)$

Q.20 Consider the statement : "For an integer n, if n^3–1 is even, then n is odd." The contrapositive statement of this statement is:

(1) For an integer n, if n is even, then n^3–1 is even

(2) For an integer n, if n is odd, then n^3–1 is even

(3) For an integer n, if n^3–1 is not even, then n is not odd.

(4) For an integer n, if n is even, then n^3–1 is odd

Sol. **(4)**

P:n^3–1 is even, q : n is odd

Contrapositive of $p \to q = \sim q \to \sim p$

⇒ If n is not odd then n^3–1 is not even

⇒ For an integer n, if n is even, then n^3–1 is odd

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Q.21 The number of words (with or without meaning) that can be formed from all the letters of the word "LETTER" in which vowels never come together is______

Sol. **120**

Consonants $\rightarrow$ LTTR

Vowels $\rightarrow$ EE

Total No of words = $\frac{6!}{2!2!} = 180$ (T and E are repeated)

Total no of words if vowels are together

= $\frac{5!}{2!}$ = 60 (E is repeated)

Required = 180 – 60 = 120

Q.22 If $\vec{x}$ and $\vec{y}$ be two non-zero vectors such that $|\vec{x}+\vec{y}| = |\vec{x}|$ and $2\vec{x}+\lambda\vec{y}$ is perpendicular to $\vec{y}$, then the value of λ is ______

Sol. **1**

$|\bar{x}+\bar{y}|^2 = |\bar{x}|^2$

$\Rightarrow |\bar{y}|^2 + 2\bar{x}.\bar{y} = 0$ ______(1)

and $(2\bar{x}+\lambda\bar{y}).\bar{y} = 0$

$\Rightarrow \lambda\left(|\bar{y}|^2\right) + 2\bar{x}.\bar{y} = 0$ ______(2)

by comparing (1) & (2)

we get λ = 1

Q.23 Consider the data on x taking the values 0, 2, 4, 8, ...,2^n with frequencies ${}^nC_0, {}^nC_1, {}^nC_2, \ldots {}^nC_n$, respectively. If the mean of this data is $\frac{728}{2^n}$, then n is equal to ______

Sol. **6**

X_i(observation)	0	2	2^2	.....	2^n
f_i (frequency)	${}^nC_0$	${}^nC_1$	${}^nC_2$	.....	${}^nC_n$

$\bar{x} = \frac{\sum f_i X_i}{\sum f_i}$

$= \frac{0\times{}^nC_0 + 2\,{}^nc_1 + 2^2\,{}^nc_2 + \ldots\ldots + 2^n\,{}^nc_n}{{}^nc_0 + {}^nc_1 + \ldots\ldots + {}^nc_n}$

$= \frac{3^n - 1}{2^n} = \frac{728}{2^n}$

$3^n = 729 = 3^6$

n = 6

Q.24 Suppose that function $f : R \to R$ satisfies f(x+y)=f(x)f(y) for all x, y $\in$ R and f(1)=3.

If $\sum_{i=1}^{n} f(i) = 363$, then n is equal to ....

Sol. **5**

f(x+y) = f(x) f(y)

f(x)=a^x

$\Rightarrow$ f(1) = a = 3

So f(x) =3^x

$$\sum_{i=1}^{n} f(i) = 363$$

$\Rightarrow$ 3 +3^2 + 3^3 +....+3^n= 363 $\Rightarrow \frac{3(3^n - 1)}{2} = 363$ $\Rightarrow$ n = 5

Q.25 The sum of distinct values of λ for which the system of equations

$(\lambda - 1)x + (3\lambda + 1)y + 2\lambda z = 0$

$(\lambda - 1)x + (4\lambda - 2)y + (\lambda + 3)z = 0$

$2x + (3\lambda + 1)y + 3(\lambda - 1)z = 0$,

has non-zero solutions,is _______

Sol. **3**

$$\begin{vmatrix} \lambda - 1 & 3\lambda + 1 & 2\lambda \\ \lambda - 1 & 4\lambda - 2 & \lambda + 3 \\ 2 & 3\lambda + 1 & 3(\lambda - 1) \end{vmatrix} = 0$$

$R_2 \to R_2 - R_1$
$R_3 \to R_3 - R_1$

$$\begin{vmatrix} \lambda - 1 & 3\lambda + 1 & 2\lambda \\ 0 & \lambda - 3 & -\lambda + 3 \\ 3 - \lambda & 0 & \lambda - 3 \end{vmatrix} = 0$$

$C_1 \to C_1 + C_3$

$$\begin{vmatrix} 3\lambda - 1 & 3\lambda + 1 & 2\lambda \\ -\lambda + 3 & \lambda - 3 & -\lambda + 3 \\ 0 & 0 & \lambda - 3 \end{vmatrix} = 0$$

$(\lambda-3)\ [(3\lambda-1)\ (\lambda-3) - (3-\lambda)\ (3\lambda + 1)] = 0$
$(\lambda-3)\ [3\lambda^2 - 10\lambda + 3 - (8\lambda - 3\lambda^2 + 3)] = 0$
$(\lambda-3)\ (6\lambda^2 - 18\lambda) = 0$
$(6\lambda)\ (\lambda-3)^2 = 0$
$\lambda = 0, 3$
sum of values of λ = 0 + 3 = 3