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Solution of Set A

Que 61 The Function $f: R \to [-\frac{1}{2}, \frac{1}{2}]$

Sol. $f(x) = \dfrac{x}{1+x^2}$ Ans 2 Surjective but Not Injective.

diff.

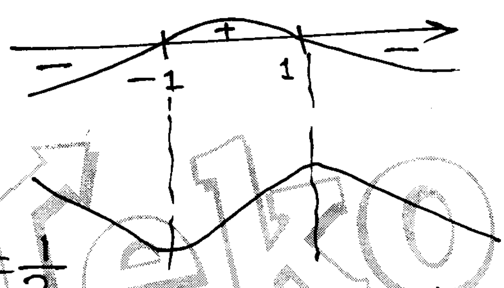
$f'(x) = \dfrac{1(1+x^2) - x(0+2x)}{(1+x^2)^2}$

$f'(x) = \dfrac{1+x^2-2x^2}{(1+x^2)^2}$

$f'(x) = \dfrac{1-x^2}{(1+x^2)^2}$ → $(1-x)(1+x)$; $(1+x^2)^2$ → +ve

for Short Tricks Batch of Advanced read last Page 27 Thanks

Wavy Curve of $f'(x)$

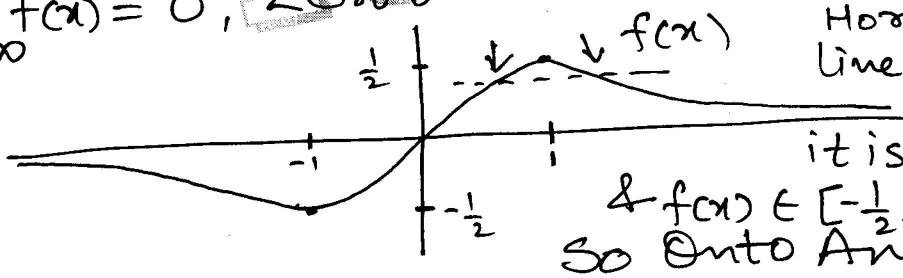


से right lower से आएगा ★

about f(x)

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

$\lim_{x \to \pm\infty} f(x) = 0$; Zero because lower degree is more.



Horizontal line cuts at 2 points

it is Many One not injective

& $f(x) \in [-\frac{1}{2}, \frac{1}{2}]$

So Onto Ans 2. P.T.O.

Solution of Set A

Q.62 If, for a positive integer n, ---

Sol.

$$x(x+1) = x^2 + 1x + 0 \quad (0\cdot1)$$
$$(x+1)(x+2) = x^2 + 3x + 2 \quad (1\cdot2)$$
$$(x+2)(x+3) = x^2 + 5x + 6 \quad (2\cdot3)$$
$$(x+3)(x+4) = x^2 + 7x + 12 \quad (3\cdot4)$$
$$(x+4)(x+5) = x^2 + 9x + 20$$

Sum.
$$(x+(n-1))(x+n) = x^2 + (2n-1)x + (n-1)(n)$$

$$10n = nx^2 + n^2 \cdot x + \sum_{r=1}^{n} (r-1)(r)$$
$$+ \sum_{r=1}^{n} (r^2 - r)$$
$$+ \sum n^2 - \sum n$$

$$10n = nx^2 + n^2x + \frac{n(n+1)(2n+1)}{6} - \frac{n(n+1)}{2}$$

÷ by n

$$10 = x^2 + nx + \frac{(n+1)}{6}\left[2n+1-3\right]$$

$$10 = x^2 + nx + \frac{(n+1)\cdot 2\cdot(n-1)}{6}$$

$$10 = x^2 + nx + \frac{(n+1)(n-1)}{3}$$

P.T.O.

Solution of Set A

Q. 62 गT Part B

$$10 = x^2 + nx + \frac{(n+1)(n-1)}{3}$$

$$30 = 3x^2 + 3nx + n^2 - 1$$

$$0 = 3x^2 + 3nx + n^2 - 31 \quad \begin{cases} \alpha \\ \alpha + 1 = \beta \end{cases}$$

So diff of roots = 1

$$|\alpha - \beta| = 1$$

$$\sqrt{(\alpha+\beta)^2 - 4\alpha\beta} = 1$$

$$\sqrt{\left(\frac{-3n}{3}\right)^2 - 4\left(\frac{n^2-31}{3}\right)} = 1$$

$$n^2 - \frac{4(n^2-31)}{3} = 1$$

$$3n^2 - 4n^2 + 4 \cdot 31 = 3$$

$$-n^2 = 3 - 124$$

$$-n^2 = -121$$

$$n = 11$$

So. Ans '3'.

P.T.O.

Solution of Set A.

Q.63 let ω be a complex Num.

Sol.
$$\begin{vmatrix} 1 & 1 & 1 \\ 1 & -\omega^2-1 & \omega^2 \\ 1 & \omega^2 & \omega^7 \end{vmatrix} = 3K$$

ω^7 will be $\omega^6.\omega = \omega$

$C_1 \to C_1 + C_2 + C_3$ & $-\omega^2 - 1 = \omega$

$$\begin{vmatrix} 3 & 1 & 1 \\ 0 & \omega & \omega^2 \\ 0 & \omega^2 & \omega \end{vmatrix}$$

$1+\omega+\omega^2 = 0$

Expan C_1

$$3\begin{vmatrix} \omega & \omega^2 \\ \omega^2 & \omega \end{vmatrix} = 3K$$

$3.(\omega^2 - \omega^4) = 3K$

$\omega^2 - \omega = K$

$\frac{-1-i\sqrt{3}}{2} - \left(\frac{-1+i\sqrt{3}}{2}\right) = K$

$-i\sqrt{3} = K$

$-Z = K$ P.T.O.

Given

$2\omega + 1 = i\sqrt{3} = Z$

$2\omega = -1 + i\sqrt{3}$

$\omega = \frac{-1+i\sqrt{3}}{2}$

$1 + x + x^2 = 0$

$x = \frac{-1 \pm \sqrt{1-4}}{2}$

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

So $\omega^2 = \frac{-1-i\sqrt{3}}{2}$

So Ans '4'

Solution of Set A

Q.64 If $A = \begin{bmatrix} 2 & -3 \\ -4 & 1 \end{bmatrix}$

Sol.

$$A^2 = \begin{bmatrix} 2 & -3 \\ -4 & 1 \end{bmatrix} \begin{bmatrix} 2 & -3 \\ -4 & 1 \end{bmatrix}$$

Prod. Rule ~~पीछे~~ आगे पे लेटाओ

$$= \begin{bmatrix} 4+12 & -6-3 \\ -8-4 & 12+1 \end{bmatrix}$$

$$A^2 = \begin{bmatrix} 16 & -9 \\ -12 & 13 \end{bmatrix} \quad \Big\{ 3A^2 = \begin{bmatrix} 48 & -27 \\ -36 & 39 \end{bmatrix}$$

$$12A = \begin{bmatrix} 24 & -36 \\ -48 & 12 \end{bmatrix}$$

$$B = 3A^2 + 12A = \begin{bmatrix} 72 & -63 \\ -84 & 51 \end{bmatrix}$$

$$\text{adj}B = \begin{bmatrix} 51 & 63 \\ 84 & 72 \end{bmatrix}$$ So Ans '1'

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Solution of Set A.

Q.65. If S is the set of distinct value of 'b'

Sol. D = 0

$$\begin{vmatrix} 1 & 1 & 1 \\ 1 & a & 1 \\ a & b & 1 \end{vmatrix} = 0$$

$$1(a-b) - 1(1-a) + 1(b-a^2) = 0$$

$$a - b - 1 + a + b - a^2 = 0$$

is not depend on 'b'

$$0 = a^2 - 2a + 1$$

$$0 = (a-1)^2$$ & depend on 'a'

$a = 1$

Now eq $x + y + z = 1$ —— ①

$x + y + z = 1$ —— ②

$x + by + z = 0$

Plane 1 & 2 are same other plane will be parallel (No Sol.) only if $b = 1$

So solution set of S is singleton.

Ans '3'

P.T.O.

Solution of Set A.

Q.66 A man X has 7 friends, 4 of them ---

Sol.

Let Suhag → X → 7 → 4L, 3M

& Suhagan → Y → 7 → 3L, 4M

No common friend

In party 3L & 3M also 3 friend each of X & Y

	X	Y
R_1 →	$L_x L_x L_x L_x$ (II)	(I) $L_y L_y L_y$
R_2 →	$M_x M_x M_x$ (III)	(IV) $M_y M_y M_y M_y$

Possibilities

0 | 3	1 | 2	2 | 1	3 | 0
3 | 0	2 | 1	1 | 2	0 | 3

$${}^4C_0 \cdot {}^3C_3 \cdot {}^3C_3 \cdot {}^4C_0 + {}^4C_1\,{}^3C_2\,{}^3C_2\,{}^4C_1 + {}^4C_2\,{}^3C_1\,{}^3C_1\,{}^4C_2 + {}^4C_3\,{}^3C_0\,{}^3C_0\,{}^4C_3$$

$$1 + 4\cdot3\cdot3\cdot4 + 6\cdot3\cdot3\cdot6 + 4\cdot1\cdot1\cdot4$$

$$1 + 144 + 324 + 16 = 485 \quad \text{Ans '4'}$$

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Solution of Set A.

Q. 67. The value of.

Sol. $^{21}C_1 + {}^{21}C_2 + {}^{21}C_3 + {}^{21}C_4 + \text{-----} + {}^{21}C_{10} = \star$

$$^{21}C_0 + {}^{21}C_1 + {}^{21}C_2 + {}^{21}C_3 + \text{-----} + {}^{21}C_{10} + {}^{21}C_{11} + {}^{21}C_{12} + \text{----} + {}^{21}C_{19} + {}^{21}C_{20} + {}^{21}C_{21} = 2^{21}$$

So we can say

$$1 + \star + 1 + \star = 2^{21}$$

$$2(1+\star) = 2^{21}$$

$$1+\star = 2^{20}$$

$$\star = 2^{20} - 1$$

$$\# = {}^{10}C_1 + {}^{10}C_2 + \text{---} + {}^{10}C_{10} = 2^{10} - 1$$

So Ans $\star - \# = (2^{20}-1) - (2^{10}-1) = 2^{20} - 2^{10}$

Ans '3'

P.T.O.

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Solution of Set A.

Q.68. for any thre positive real num.

Sol.

$$9(25a^2+b^2)+25(c^2-3ac)=15b(3a+c)$$

$$225a^2+25c^2+9b^2-75ac-45ab-15bc=0.$$

$$(15a)^2+(3b)^2+(5c)^2-\frac{150ac}{2}-\frac{90ab}{2}-\frac{30bc}{2}=0.$$

$$☆^2+\#^2+♡^2-☆\#-\#♡-☆♡=0$$

$$(☆-\#)^2+(\#-♡)^2+(☆-♡)^2=0$$

so $☆=\#=♡$

$15a=3b=5c$

$\div 15$ $\quad a=\frac{b}{5}=\frac{c}{3}=♡$

$a=♡\}\ b=5♡\{\ c=3♡$

so a, c, b or b, c, a are in AP.

Ans '1'

P.T.O.

Solution of Set A.

Q.69. let a, b, c $\in R$; If $f(x) = ax^2+bx+c$ ...
$a+b+c = 3$ Given

Sol. $f(x+y) = f(x)+f(y)+xy \quad \forall x,y \in R$

$f(x+y) - f(x) = f(y) + xy$

$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h} = \lim_{h\to 0} \frac{f(h)+xh}{h}$

$f'(x) = \lim_{h\to 0} \frac{f(h)}{h} + x.$

We can use short Trick of partial diff. in given condition directly.

$f'(x) = \lim_{h\to 0} \frac{f(0+h)-f(0)}{h} + x.$ it must be $f(0)=0=c$

$f'(x) = f'(0) + x.$

$f'(x) = b + x.$

$\left\{ \begin{array}{l} f(x) = ax^2+bx. \\ f'(x) = 2ax+b \\ f'(0) = b \end{array} \right.$

integrate

$f(x) = bx + \frac{x^2}{2} + c \to c = C = 0$

$f(x) = \frac{1}{2}x^2 + bx + 0 \qquad a = \frac{1}{2}$

Given $a+b+c = 3$

$\frac{1}{2} + b + 0 = 3 \longrightarrow b = \frac{5}{2}$

$\sum_{n=1}^{10} f(n) = \sum_{n=1}^{10}\left(\frac{1}{2}n^2 + \frac{5}{2}n\right) = \frac{1}{2}\left(\frac{10.11.21}{6}\right) + \frac{5}{2}\left(\frac{10.11}{2}\right)$

$= \frac{1}{2}[10.11]\left[\frac{7}{2}+\frac{5}{2}\right] = 10.11.3 = 330$

Ans '4' P.T.O.

SET (A)

Q.70 ⇒ $\lim_{x \to \pi/2} \frac{\cot x - \cos x}{(\pi - 2x)^3}$

$\Rightarrow \lim_{x \to \pi/2} \frac{\cos x(1 - \sin x)}{(\pi - 2x)^3 \sin x} \Rightarrow \lim_{h \to 0} \frac{\cos(\pi/2 + h)\left(1 - \sin(\pi/2 + h)\right)}{(\pi - \pi - 2h)\sin(\pi/2 + h)}$

$\Rightarrow \lim_{h \to 0} \frac{+\sin h(1 - \cos h)}{+8h^3(\cos h)}$

$\left\{ \lim_{h \to 0} \frac{\sin h}{h} = 1, \quad \lim_{h \to 0} \frac{1 - \cos h}{h^2} = \frac{1}{2} \right\}$

$\Rightarrow \lim_{h \to 0} \frac{(1)\sin h}{16\, h}$

$= \frac{1}{16}$ Ans. (1).

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Solution of set A

Q.71. If for $x \in (0, \frac{1}{4})$ the derivative----

Sol.

$$\frac{d}{dx}\tan^{-1}\left(\frac{6\sqrt{x}\cdot x}{1-9x^3}\right) = \sqrt{x}\cdot g(x)$$

let $3x\sqrt{x} = \tan\theta$ $\to \theta = \tan^{-1}3x\sqrt{x}$.

$$\frac{d}{dx}\tan^{-1}\left(\frac{2\tan\theta}{1-\tan^2\theta}\right)$$

Here $\tan^2\theta < 1$ as $x \in (0, \frac{1}{4})$

$$\frac{d}{dx}\tan^{-1}(\tan 2\theta)$$

$$\frac{d}{dx}(2\theta)$$

$$2\frac{d}{dx}(\tan^{-1}3x\sqrt{x}) = 2\left(\frac{1}{1+9x^3}\right)\frac{d}{dx}(3x\sqrt{x})$$

$$= 2\times\frac{1}{1+9x^3}\times 3\left(\frac{3}{2}\cdot x^{1/2}\right)$$

$$= \frac{9\sqrt{x}}{1+9x^3} = \sqrt{x}\cdot\frac{9}{1+9x^3}$$ ($g(x)$)

So Ans '4' P.T.O.

Solution of Set A

Q72 The normal to the curve ----

Sol cut at y axis $x_1 = 0$

$$y_1(0-2)(0-3) = 0+6$$

$$y_1 = 1$$

$$(0,1)$$

$$y = \frac{x+6}{x^2-5x+6}$$

$$m_t = \frac{dy}{dx} = \frac{1(x^2-5x+6)-(x+6)(2x-5)}{(x^2-5x+6)^2}$$

$x \to 0$

$$m_t = \frac{6-(6)(-5)}{6^2}$$

$$= \frac{6(1+5)}{6^2} = 1$$

$$m_n = -1$$

Eq of Normal at (0,1) $(y-1) = -1(x-0)$

$$y-1 = -x$$

$$x+y = 1$$

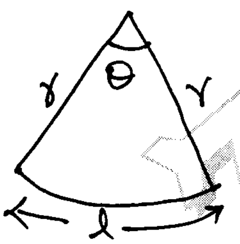
So Ans 1 $\left(\frac{1}{2},\frac{1}{2}\right)$

P.T.O.

Solution of Set A

Q.73. Twenty meters of wire is available.....

Sol.



angle = $\frac{arc}{rad}$ } θ in radian

$\theta = \frac{l}{r} \longrightarrow l = \theta \cdot r$

Given $l + 2r = 20$

Area = $\frac{\theta r^2}{2}$ {θ in radian}

$\theta \cdot r + 2r = 20$

$r = \frac{20}{\theta + 2}$

$f(\theta) = \text{Area} = \frac{1}{2}\theta \cdot \left(\frac{20}{\theta+2}\right)^2$

$f'(\theta) = \frac{1}{2} 400 \frac{d}{d\theta}\left(\frac{\theta}{(\theta+2)^2}\right) = 200\left[\frac{1\cdot(\theta+2)^2 - \theta \cdot 2\cdot(\theta+2)}{(\theta+2)^4}\right]$

for extreme $(\theta+2)^2 - \theta \cdot 2(\theta+2) = 0$

$(\theta+2)(\theta+2-2\theta) = 0$

$(\theta+2)(2-\theta) = 0$

$\theta = -2$ or 2 ✓

$\text{Area} = \frac{1}{2}\cdot 2 \cdot \left(\frac{20}{2+2}\right)^2 = \left(\frac{20}{4}\right)^2 = 5^2 = 25$

Ans '2'

P.T.O.

Solution of Set A.

Q.74

let $I_n = \int \tan^n x\,dx$

$I_4 + I_6 = a\tan^5 x + b x^5 + C$

$\int (\tan^4 x + \tan^6 x)\,dx =$ ↓

$\int (\tan^4 x)(1+\tan^2 x)\,dx =$ ↓

$\int (\tan^4 x)(\sec^2 x)\,dx =$ ↓

$\tan x = t$
$\sec^2 x = dt$

$\int t^4\,dt$

$\frac{t^5}{5} + C = a\tan^5 x + b x^5 + C$

$a = \frac{1}{5}$ & $b = 0$

Ans '1'

P.T.O.

Solution of Set A.

Q. 75.

$$I = \int_{\pi/4}^{3\pi/4} \frac{1}{1+\cos x}\,dx$$

on rationalizing

$$I = \int_{\pi/4}^{3\pi/4} \frac{1-\cos x}{(1^2-\cos^2 x)}\,dx$$

$$I = \int_{\pi/4}^{3\pi/4} \operatorname{cosec}^2 x\,dx - \int_{\pi/4}^{3\pi/4} \frac{\cos x}{\sin^2 x}\,dx$$

$$I = [+\cot x]_{\pi/4}^{3\pi/4} - \int_{\pi/4}^{3\pi/4} \operatorname{cosec} x \cot x\,dx$$

$$I = \Big[[+\cot x] + [\operatorname{cosec} x]\Big]_{\pi/4}^{3\pi/4}$$

P.T.O.

$I = 1 + 1$

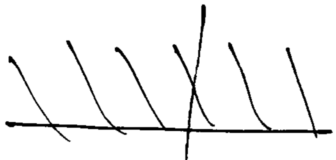
$= '2'$ (1).

Ans.

Solution of Set A

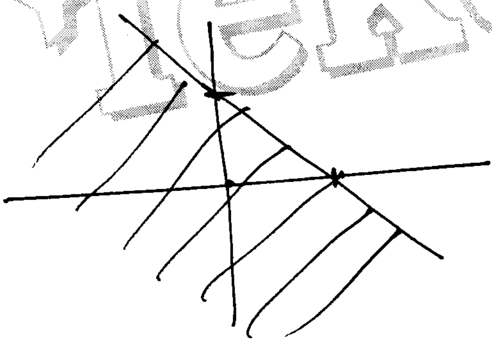
Q.76. The area (in sq. units) of the region...

$x \geq 0$



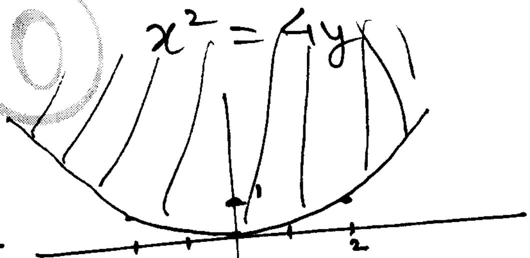
$x + y \leq 3$

$x + y = 3$



$x^2 \leq 4y$

$x^2 = 4y$

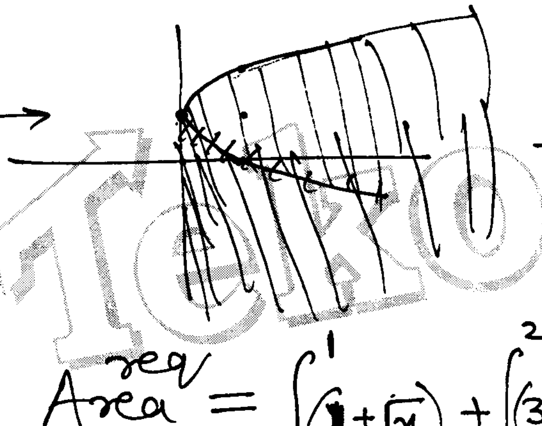


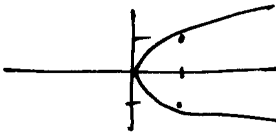
$y \leq 1 + \sqrt{x}$.

$y - 1 \leq \sqrt{x}$.

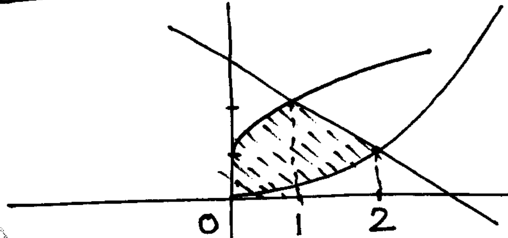
$(y-1)^2 = x$.

$y^2 = x$





Final



$$\text{Area}_{req} = \int_0^1 (1+\sqrt{x}) + \int_1^2 (3-x) - \int_0^2 \frac{x^2}{4}$$

$$= \left(x + \frac{2}{3}x^{3/2}\right)_0^1 + \left(3x - \frac{x^2}{2}\right)_1^2 - \left(\frac{1}{12}x^3\right)_0^2$$

$$= \frac{5}{3} + 4 - \frac{5}{2} - \frac{2}{3} = \frac{5}{2} \text{ Ans '3'}$$

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Solution of Set A.

Q.77 If $(2+\sin x)\frac{dy}{dx} + (y+1)\cos x = 0$

Method 1

$(2+\sin x)\frac{dy}{dx} + y\cdot\cos x = -\cos x.$

$\frac{dy}{dx} + y\left(\frac{\cos x}{2+\sin x}\right) = \frac{-\cos x}{2+\sin x}.$

$\frac{dy}{dx} + y\cdot P = Q.$

We can use I.F.

Now Method 2

$$\int \frac{dy}{y+1} = \int \frac{-\cos x}{2+\sin x}\,dx$$

$$\ln(y+1) = -\ln(2+\sin x) + \ln c$$

$$y+1 = \frac{c}{2+\sin x}$$

(0, 1)

$y+1 = \frac{c}{2} \rightarrow c = 4$

$y+1 = \frac{4}{2+\sin x}.$

$x \rightarrow \frac{\pi}{2}$

$y+1 = \frac{4}{3+1}$

$y = \frac{4}{3} - 1 = \frac{1}{3}.$

Ans '4'

P.T.O.

Solution of Set A

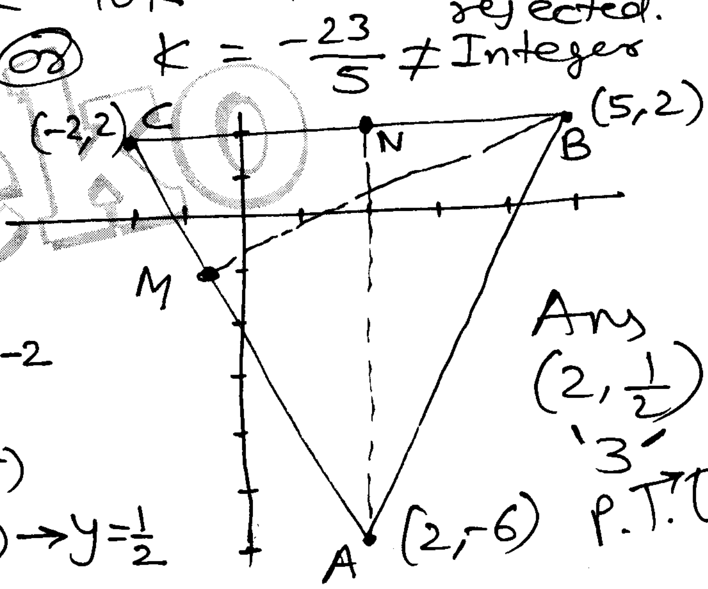
Q.78 let k be an integer such that the triangle

Sol.
$$\frac{1}{2}\begin{vmatrix} k & -3k & 1 \\ 5 & k & 1 \\ -k & 2 & 1 \end{vmatrix} = 28$$

Or Short Trick
$$\frac{1}{2}\begin{vmatrix} k & -3k \\ 5 & k \\ -k & 2 \\ k & -3k \end{vmatrix} = 28$$

$$k^2 + 15k + 10 + k^2 + 3k^2 - 2k = 56$$
$$5k^2 + 13k - 46 = 0$$
$$5k^2 + 23k - 10k - 46 = 0$$
$k = 2$ Or $k = -\frac{23}{5} \neq$ Integer rejected.

So vertices
(2, −6)
(5, 2)
(−2, 2)



slope of AC $= m_1 = \frac{8}{-4} = -2$
slope of BM $= m_2 = 1/2$
eq of BM $\rightarrow (y-2) = \frac{1}{2}(x-5)$
Put $x = 2$ / eq of AN $\rightarrow y - 2 = \frac{1}{2}(2-5) \rightarrow y = \frac{1}{2}$

Ans $\left(2, \frac{1}{2}\right)$ '3'

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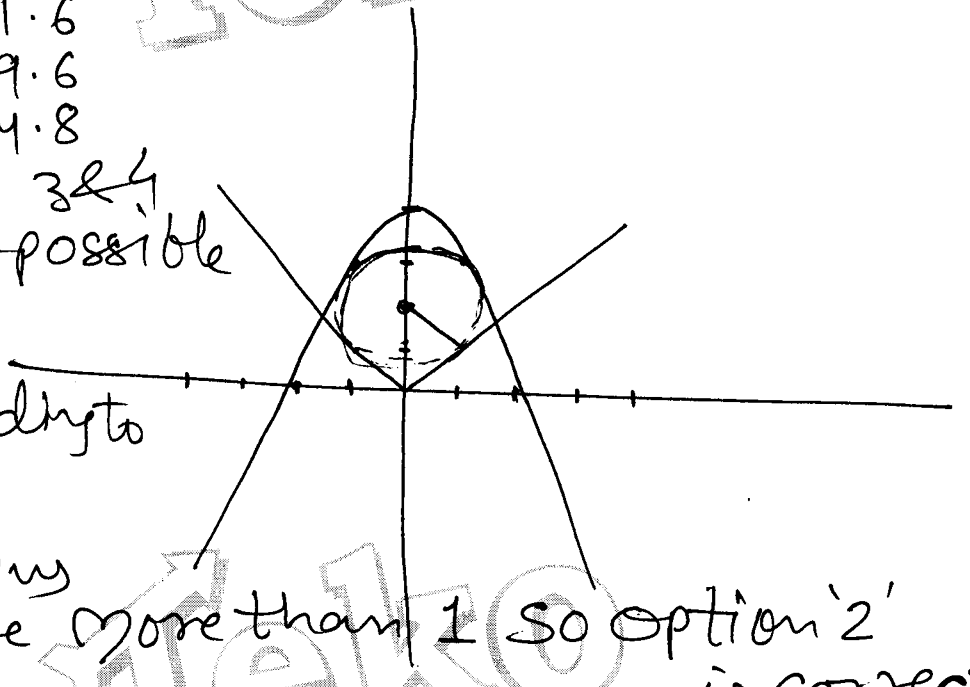
Solution of Set A.

Q.79. The radius of a circle, having---

Sol. Here we can get answer using option.

1 → 0.8
2 → 1.6
3 → 9.6
4 → 4.8

option 3 & 4 Not possible



according to figure radius Must be more than 1 so option '2' is correct

Ans '2'

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Solution of set (A)

Q.80 The eccentricity - - - - - $\frac{1}{2}$.

directrix $\Rightarrow x = \frac{a}{e}$ & $-\frac{a}{e}$.

so $\frac{a}{e} = 4$ $\quad \frac{a}{\frac{1}{2}} = 4 \Rightarrow a = 2$.

& $b^2 = a^2(1-e^2) \rightarrow b^2 = 4\left(1-\frac{1}{4}\right) \Rightarrow b^2 = 3$.

so eqn of ellipse

$\frac{x^2}{4} + \frac{y^2}{3} = 1$.

diff.. $\frac{x}{2} + \frac{2y}{3} \cdot y' = 0$.

$x = 1$ $y = \frac{3}{2}$.

$\frac{1}{2} + y' = 0 \Rightarrow y' = -\frac{1}{2}$

so slope of normal $= 2$.

checking option only option (1) has slope 2.

Q.81 A hyperbola - - - - - point

Foci are $(\pm ae, 0)$

so $ae = 2$.

we know that $b^2 = a^2(e^2-1) \Rightarrow b^2 = a^2e^2 - a^2$

$b^2 = 4 - a^2 \Rightarrow b^2 + a^2 = 4$.

$b^2 = 4 - a^2$

eqn of hyp. $\frac{x^2}{a^2} - \frac{y^2}{4-a^2} = 1$ passing $\sqrt{2}, \sqrt{3}$ P.T.O.

$\frac{2}{a^2} - \frac{3}{4-a^2} = 1 \Rightarrow a^4 - 9a^2 + 8 = 0$.

$a = \pm 1$ or $a = \pm\sqrt{8}$.

Taking $= a = 1$.

continuing 81: $\frac{x^2}{1} - \frac{y^2}{3} = 1.$

differentiation $2x - \frac{2yy'}{3} = 0.$

$P(\sqrt{2}, \sqrt{3})$

$2\sqrt{2} - \frac{2.\sqrt{3}y'}{3} = 0 \Rightarrow y' = \sqrt{6}.$

so eq^n of tangent

$(y - \sqrt{3}) = \sqrt{6}(x - \sqrt{2})$

checking option(1)

$2\sqrt{3} = \sqrt{6}(\sqrt{2})$

$\sqrt{12} = \sqrt{12}$ so option(1) is correct.

P.T.O

Q.82 Solution of set(A)

equation of plane passing through (x_1, y_1, z_1) & L_1 & L_2 are normal to plane.

$$\begin{vmatrix} x-x_1 & y-y_1 & z-z_1 \\ a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \end{vmatrix} = 0.$$

$$\begin{vmatrix} x-1 & y-3 & z+7 \\ 1 & -2 & 3 \\ 2 & -1 & -1 \end{vmatrix} = 0.$$

$5x + 7y + 3z + 5 = 0.$ $P(1, 3, -7)$

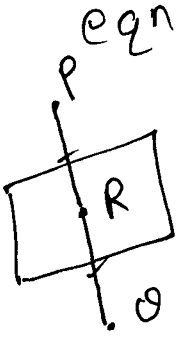
$$d = \frac{5(1)+7(3)+3(-7)+5}{\sqrt{5^2+7^2+3^2}}$$

$$= \frac{10}{\sqrt{83}}$$ option (1)

Q.83 If the ~~ptd~~, image of point ------

$P(1, -2, 3)$ $2x + 3y - 4z + 22 = 0.$

eq^n of line passing through P & ⊥ to (L). is



$$\frac{x-1}{1} = \frac{y+2}{4} = \frac{z-3}{5} = k$$

$x = k+1$ $y = 4k-2$ $z = 5k+3.$

Now the point on plane at which it cuts

$2(k+1) + 3(4k-2) - 4(5k+3) + 22 = 0$

$-6k + 6 = 0 \rightarrow k = 1$ P.T.O.

Let this point be (R) $x = 2, y = 2, z = 8.$

$PQ = 2PR$

$PQ = 2.\sqrt{(2-1)^2 + (2-(-2))^2 + (8-3)^2} = 2\sqrt{42}$ (1)

Solution of set (A)

Q-84 Let $\vec{a} = 2i + j - 2k$. - - - - - - - - -.

$\vec{a} \times \vec{b} = \begin{vmatrix} i & j & k \\ 2 & 1 & -2 \\ 1 & 1 & 0 \end{vmatrix} \rightarrow i(2) - j(2) + k(1)$

now. $|\vec{a} \times \vec{b}| = 3$

$|(\vec{a} \times \vec{b}) \times \vec{c}| = |\vec{a} \times \vec{b}| \times |\vec{c}| . \sin\theta$

$3 = 3 \times |\vec{c}| . \frac{1}{2} \rightarrow |\vec{c}| = \frac{1 \times 2}{1} = 2.$

now $|\vec{c} - \vec{a}| = 3.$

sq both sides.

$|\vec{c}|^2 + |\vec{a}|^2 - 2\vec{a}.\vec{c} = 9$. and $|\vec{a}| = 3.$

$4 + 9 - 2\vec{a}.\vec{c} = 9$

$\vec{a}.\vec{c} = \frac{4}{2} = 2$ option (1)

Q85 A box contains 15 Green - - - -

Prabablity of success (P) $= \frac{15}{25} = \frac{3}{5}$.

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

& $n = 10$.

variance $= npq = 10 \times \frac{3}{5} \times \frac{2}{5} = \frac{12}{5}$ option (4)

P.T.O.

Solution of set(A)

Q.86 set(A)

Q.86

For three events A, B, C ------

we know that P(exactly one of A or B) = $P(A\cup B) - P(A\cap B)$

$\therefore \frac{1}{4} = P(A\cup B) - P(A\cap B)$; $\frac{1}{4} = P(B\cup C) - P(B\cap C)$ & $\frac{1}{4} = P(A\cup C) - P(A\cap C)$

adding (i) (ii) & (iii)

$\frac{3}{4} = P(A\cup B) + P(B\cup C) + P(A\cup C) - P(A\cap B) - P(B\cap C) - P(C\cap A)$

now $\frac{3}{4} = 2P(A) + 2P(B) + 2P(C) - 2\{P(A\cap B) - P(B\cap C) - P(C\cap A)\}$

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

$\frac{3}{8} = P(A) + P(B) - P(C) - P(A\cap B) - P(B\cap C) - P(C\cap A)$

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

so $P(A\cup B\cup C) = \frac{3}{8} + \frac{1}{16} = \frac{7}{16}$ (option(1).)

Q.87 Q.87 If two different ---- multiple of 4.

Total cases $= {}^{11}C_2 = 55$.

now (0, 4) (0, 8) (2, 6) (2, 10) (4, 8) (6, 10) are the pairs of which difference & sum both are multiple of 4

so Probablity $= \frac{6}{55}$.

P.T.O.

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Solution of Set A

Q.88 If $5(\tan^2 x - \cos^2 x) = 2\cos 2x + 9$.

$5(\tan^2 x - \cos^2 x) = 2\cos 2x + 2 + 7$.

$5(\sec^2 x - 1 - \cos^2 x) = 2(2\cos^2 x) + 7$

$5(\sec^2 x - 1 - \cos^2 x) = 4\cos^2 x + 7$

Let $\cos^2 x = t$

$5\left(\frac{1}{t} - 1 - t\right) = 4t + 7$

$5(1 - t - t^2) = 4t^2 + 7t$

$5 - 5t - 5t^2 = 4t^2 + 7t$

$9t^2 - 12t - 5 = 0$

$t = -\frac{5}{3}$ (not possible) or $t = \frac{1}{3}$.

now $\cos^2 x = \frac{1}{3}$

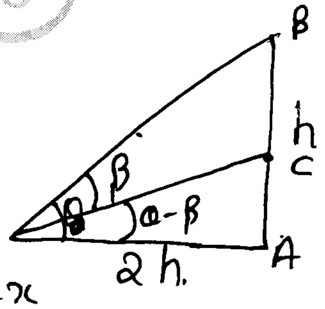
$\frac{1 + \cos 2x}{2} = \frac{1}{3} \rightarrow \cos 2x = -\frac{1}{3}$.

now $\cos 4x = 2\cos^2 2x - 1 \rightarrow 2\left(\frac{1}{9}\right) - 1 = -\frac{7}{9}$. option (3)

Q.89 Q.89 Let a vertical ---- equal to.

$\tan\alpha = \frac{h}{2h} = \frac{1}{2}$.

& $\tan(\alpha - \beta) = \frac{\frac{h}{2}}{2h} = \frac{1}{4}$.



$\frac{\tan\alpha - \tan\beta}{1 + \tan\alpha\tan\beta} = \frac{1}{4}$ Let $\tan\beta = x$

$\frac{\frac{1}{2} - x}{1 + \frac{1}{2}x} = \frac{1}{4} \longrightarrow \frac{9x}{2} = 1 \longrightarrow x = \frac{2}{9}$. Option (2)

P.T.O.

Q.90

p	q	$\sim p$	$\sim q$	$p \to q$	$(\sim p \to q)$	$(\sim p \to q) \to q$	$(p \to q \to r)$
T	T	F	F	T	T	T	T
T	F	F	T	F	T	F	T
F	T	T	F	T	T	T	T
F	F	T	T	T	F	T	T

Hence it is a tautology.
above is set(A) Q.90.

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