ANSWERS

	Set – 1		Set – 2		Set - 3
1	c) $\frac{x^2}{2}$ + log |x| + c	1	b) $\frac{x^2}{2}$ + log |x| + c	1	b) $\frac{x^2}{2}$ + log |x| + c
2	d) k = 1	2	a) k = 1	2	c) k = 1
3	a) $\frac{-8}{3}$	3	d) $\frac{-8}{3}$	3	c) $\frac{-8}{3}$
4	c) I	4	a) I	4	b) I
5	b) 60	5	c) 60	5	a) 60
6	a) $(1 + x^2)$	6	c) $(1 + x^2)$	6	b) $(1 + x^2)$
7	c) $- xe^{-x} - e^{-x} + c$	7	b) $- xe^{-x} - e^{-x} + c$	7	d) $- xe^{-x} - e^{-x} + c$
8	c) -3	8	b) -3	8	d) -3
9	d) $\frac{1}{4}$	9	a) $\frac{1}{4}$	9	b) $\frac{1}{4}$
10	a) -75	10	b) -75	10	c) -75
11	d) No feasible region	11	b) No feasible region	11	a) No feasible region
12	a) 4	12	c) 4	12	b) 4
13	b) $\frac{1}{20}$	13	d) $\frac{1}{20}$	13	c) $\frac{1}{20}$
14	c) -3	14	a) -3	14	b) -3
15	c) $\left(\frac{6}{7}, \frac{2}{7}, \frac{3}{7}\right)$	15	b) $\left(\frac{6}{7}, \frac{2}{7}, \frac{3}{7}\right)$	15	a) $\left(\frac{6}{7}, \frac{2}{7}, \frac{3}{7}\right)$
16	b) 0.28	16	d) 0.28	16	c) 0.28
17	d) None of these	17	b) - 1	17	a) - 1
18	a) 2	18	d) 2	18	d) 2
19	(A) Both A and R are true and R is the correct explanation of A				
20	(C) A is true but R is false				

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$$\sin^{-1}\left(\cos\left(\frac{33\pi}{5}\right)\right) = \sin^{-1}\cos\left(6\pi + \frac{3\pi}{5}\right)$$

$$= \sin^{-1}\cos\left(\frac{3\pi}{5}\right) = \sin^{-1}\sin\left(\frac{\pi}{2} - \frac{3\pi}{5}\right)$$

$$= \frac{\pi}{2} - \frac{3\pi}{5} = -\frac{\pi}{10}.$$

OR

$$\sin\cos^{-1}\left(\frac{3}{5}\right) = \sin\left(\sin^{-1}\frac{4}{5}\right) = \frac{4}{5}$$

$$\sin\left(\frac{\pi}{2} - \sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right) = \sin\left(\frac{\pi}{2} + \frac{\pi}{3}\right)$$

$$= \sin\frac{5\pi}{6} = \frac{1}{2} \therefore \text{L.H.S.} = \frac{4}{3} + \frac{1}{2} = \frac{13}{10}$$

22

Since $\vec{r}$ is inclined equal angles to axes

$\therefore \alpha = \beta = y$

$3\cos^2\alpha = 1$

$\therefore 3\cos\alpha = \pm\frac{1}{\sqrt{3}}$

Now componenets in each direction are equal

Let $\vec{r} = a\hat{i} + a\hat{j} + a\hat{k}$

$\therefore |\vec{r}| = \sqrt{a^2 + a^2 + a^2} = \sqrt{3}a$

$\sqrt{3}a = 2\sqrt{3} \Rightarrow a = 2$

$\vec{r} = 2\hat{i} + 2\hat{j} + 2\hat{k}$

- OR -

We form the vectors $\vec{AB}$ and $\vec{AC}$

$\vec{AB} = 2 - 1, -1 - 2, 4 - 3 \Rightarrow 1, -3, 1$

$\vec{AC} = 4 - 1, 5 - 2, -1 - 3 \Rightarrow 3, 3, -4$

We find their cross product $\vec{AB} \times \vec{AC} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & -3 & 1 \\ 3 & 3 & -4 \end{vmatrix}$

$= i(-4(-3) - 3) - \vec{j}(-4 - 3) + \vec{k}(3 + 9)$

$= 9\vec{i} + 7\vec{j} + 12\vec{k}$

So, the magnitude is {9, 7, 12}

$= \sqrt{9^2 + 7^2 + 12^2} = \sqrt{81 + 49 + 144} = \sqrt{274} \approx 16.55$

The triangle's area is $\frac{1}{2}$ the area of that parallelogram.

So, Area of traingle $= \frac{1}{2} \times 16.55 \Rightarrow \frac{16.55}{2} = 8.275$ Sq.units

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Let at any time 't' length of edge of cube is x and its volume is V then

$V = x^3$ .....(i)

and this edge is increasing at the rate of 3 cm/s.

$\therefore dx/dt = 3$cm/s.

We have to find, rate of change of volume V

When x=10cm

$\therefore dv/dt = 3x^2 dx/dt$

$\Rightarrow dV/dt = 3x^2.3 = 9x^2$

When x=10cm, $dv/dt = 9(10)^2 = 900 cm^3/s$

Hence, Rate of change of Volume is $900cm^3/sec$.

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Given,

$(2\hat{i} + 6\hat{j} + 27\hat{k}) \times (\hat{i} + \lambda\hat{j} + \mu\hat{k}) = 0$

$\Rightarrow \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & 6 & 27 \\ 1 & \lambda & \mu \end{vmatrix} = 0 \Rightarrow \hat{i}(6\mu - 27\lambda) - \hat{j}(2\mu - 27) + \hat{k}(2\lambda - 6) = 0\hat{i} + 0\hat{j} + 0\hat{k}$

On comparing the corresponding components, we have

$6\mu - 27\lambda = 0, -2\mu + 27 = 0, 2\lambda - 6 = 0 \Rightarrow 2\mu = -9\lambda, \mu = \frac{27}{2}$ and $\lambda = 3$

Hence, $\lambda = 3$ and $\mu = \frac{27}{2}$

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here, $x = a\left(\cos t + \log\tan\frac{t}{2}\right)$

Therefore, $\frac{dx}{dt} = a\left(-\sin t + \frac{1}{\tan\frac{t}{2}}.\sec^2\frac{t}{2}.\frac{1}{2}\right) = a\left(-\sin t + \frac{\cos\frac{t}{2}}{\sin\frac{t}{2}}.\frac{1}{\cos^2\frac{t}{2}}.\frac{1}{2}\right)$

$= a\left(-\sin t + \frac{1}{2\sin\frac{t}{2}\cos\frac{t}{2}}\right) \qquad = a\left(-\sin t + \frac{1}{\sin t}\right)$

$= a\left(\frac{-\sin^2 t + 1}{\sin t}\right) \qquad = a\left(\frac{\cos^2 t}{\sin t}\right)$

$y = a\sin t \qquad \frac{dy}{dt} = a\cos t$

$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{a\cos t}{a\left(\frac{\cos^2 t}{\sin t}\right)} = \frac{\sin t}{\cos t} = \tan t$

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$\int_{-1}^{2} |x^3 - x| dx$

It is clear that

$x^3 - x \geqslant 0$ on $[-1, 0]$

$x^3 - x \leqslant 0$ on $[0, 1]$

$x^3 - x \geqslant 0$ on $[1, 2]$

Hence the interval of the integral can be subdivided as

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

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

$= \left[\frac{x^4}{4} - \frac{x^2}{2}\right]_{-1}^{0} + \left[\frac{x^2}{2} - \frac{x^4}{4}\right]_{0}^{1} + \left[\frac{x^4}{4} - \frac{x^2}{2}\right]_{1}^{2}$

$\left[\int x^n dx = \frac{x^{n+1}}{n+}\right] \quad = -\left(\frac{1}{4} - \frac{1}{2}\right) + \left(\frac{1}{2} - \frac{1}{4}\right) + (4 - 2) - \left(\frac{1}{4} - \frac{1}{2}\right) = \frac{11}{4}$ Ans

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Let $I = \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sin x+\cos x}{\sqrt{\sin 2x}} dx$

$\Rightarrow I = \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{(\sin x+\cos x)}{\sqrt{-(-\sin 2x)}} dx$

$\Rightarrow I = \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sin x+\cos x}{\sqrt{-(-1+1-2\sin x\cos x)}} dx$

$\Rightarrow I = \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{(\sin x+\cos x)}{\sqrt{1-(\sin^2 x+\cos^2 x-2\sin x\cos x)}} dx$

$\Rightarrow I = \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{(\sin x+\cos x)dx}{\sqrt{1-(\sin x-\cos x)^2}}$

Let $(\sin x - \cos x) = t \;\; \Rightarrow (\sin x + \cos x)dx = dt$

When $x = \frac{\pi}{6}, t = \left(\frac{1-\sqrt{3}}{2}\right)$,

when $x = \frac{\pi}{3}, t = \left(\frac{\sqrt{3}-1}{2}\right)$

$I = \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sin x+\cos x}{\sqrt{\sin 2x}} dx \quad = \int_{\frac{1-\sqrt{3}}{2}}^{\frac{\sqrt{3}-1}{2}} \frac{dt}{\sqrt{1-t^2}}$

$$I = \int_{-\left(\frac{\sqrt{3}-1}{2}\right)}^{\frac{\sqrt{3}-1}{2}} \frac{dt}{\sqrt{1-t^2}}$$

As $\frac{1}{\sqrt{1-(-t)^2}} = \frac{1}{\sqrt{1-t^2}}$, hence, $\frac{1}{\sqrt{1-t^2}}$ is an even function

As we know that if $f(x)$ is an even function, then

$\int_{-a}^{a} f(x)dx = 2\int_0^a f(x)dx$

$\Rightarrow I = 2\int_0^{\frac{\sqrt{3}-1}{2}} \frac{dt}{\sqrt{1-t^2}} \quad = [2\sin^{-1} t]_0^{\frac{\sqrt{3}-1}{2}}$

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

OR

$I = \int \frac{\sqrt{x}}{\sqrt{a^3 - x^3}} dx$

Substitute $x^{\frac{3}{2}} = t$

$\Rightarrow \quad \frac{3}{2} x^{\frac{1}{2}} dx = dt$

$x^{\frac{1}{2}} dx = \frac{2}{3} dt$

$\Rightarrow \quad \left(x^3\right)^{\frac{1}{2}} = t \;\; \Rightarrow \;\; x^3 = t^2$

Putting the values in I, we get

$$I = \int \frac{\sqrt{x}}{\sqrt{a^3 - x^3}} dx \; = \frac{2}{3}\int \frac{1}{\sqrt{a^3 - t^2}} dx$$

Using the following formula of integration, we get

$$\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1}\left(\frac{x}{a}\right)$$

$$\therefore \frac{2}{3}\int \frac{1}{\sqrt{\left((a^{3/2})^2 - t^2\right)}} dt = \frac{2}{3}\sin^{-1}\left(\frac{t}{a^{\frac{3}{2}}}\right) + C$$

Again, putting the value of t, we get

$$\frac{2}{3}\int \frac{1}{\sqrt{a^3 - t^2}} dt = \frac{2}{3}\sin^{-1}\left(\frac{t}{a^{\frac{3}{2}}}\right) + C \; = \frac{2}{3}\sin^{-1}\left(\frac{x^{\frac{3}{2}}}{a^{\frac{3}{2}}}\right) + C$$

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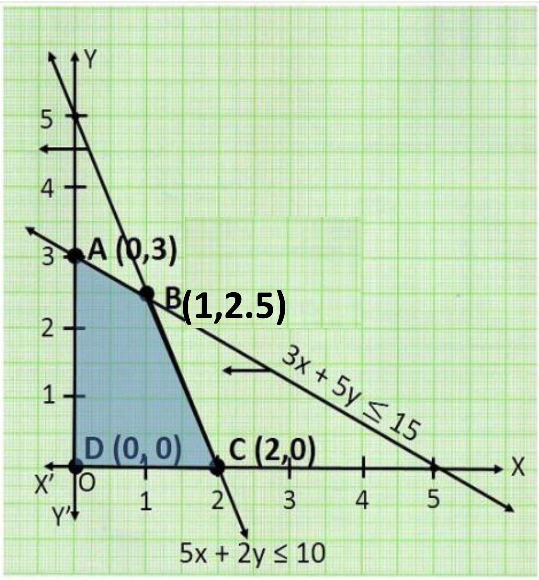
The maximum value of Z is 12.5 at the point $B(1, 2.5)$



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$P(H) = 60\% = \frac{6}{10} = \frac{3}{5}$ $P(E) = 40\% = \frac{40}{100} = \frac{2}{5}$ $P(H \cap E) = 20\% = \frac{20}{100} = \frac{1}{5}$

(i).The probability that a student reads Hindi or English newspaper is given by,

$P(H \cup E)' = 1 - P(H \cup E) = 1 - \{P(H) + P(E) - P(H \cap E)\} = 1 - \left(\frac{3}{5} + \frac{2}{5} - \frac{1}{5}\right) = 1 - \frac{4}{5} = \frac{1}{5}$

(ii) The probability that a randomly chosen student reads English newspaper, if she reads Hindi newspaper, is given by P(E|H).

$P(E|H) = \frac{P(E \cap H)}{P(H)} = \frac{\frac{1}{5}}{\frac{3}{5}} = \frac{1}{3}$

(iii) The probability that a randomly chosen student reads Hindi newspaper, if she reads English newspaper, is given by P(H|E).

$P(H|E) = \frac{P(H \cap E)}{P(E)} = \frac{\frac{1}{5}}{\frac{2}{5}} = \frac{1}{2}$

\- OR -

Let E_1 be the event that the outcome on the die is 5 or 6. $\therefore P(E_1) = \frac{2}{6} = \frac{1}{3}$

Let E_2 be the event that the outcome on the die is 1, 2, 3, or 4. $P(E_2) = \frac{4}{6} = \frac{2}{3}$

Let A be the event of getting exactly one head.

$P(A|E_1)$ = Probability of getting exactly one head by tossing the coin three times if she gets 5 or 6 $= \frac{3}{8}$

$P(A|E_2)$ = Probability of getting exactly one head in a single throw of coin if she gets 1,2, 3, or 4 $= \frac{1}{2}$

Hence, the probability that the girl threw 1, 2, 3, or 4 with the die, if she obtained exactly one head, is given by $P(E_2|A)$.

By using Bayes' theorem, we get: $P(E_2|A) = \frac{P(E_2).P(A|E_2)}{P(E_1)\cdot P(A|E_1) + P(E_2)\cdot P(A|E_2)} = \frac{\frac{2}{3}\times\frac{1}{2}}{\frac{1}{3}\times\frac{3}{8}+\frac{2}{3}\times\frac{1}{2}}$

$= \frac{\frac{1}{3}}{\frac{1}{3}\left(\frac{3}{8}+1\right)} = \frac{1}{\frac{11}{8}} = \frac{8}{11}$

30

$\frac{x^2+1}{x^2-5x+6} = 1 + \frac{5x-5}{x^2-5x+6}$

$= 1 + \frac{5x-5}{(x-2)(x-3)}$

$\frac{5x-5}{(x-2)(x-3)} = \frac{A}{x-2} + \frac{B}{x-3}$

$5x - 5 = A(x-3) + B(x-2)$

Equating the coefficients of x $A + B = 5$

Equating the constant terms $3A + 2B = 5$

Solving $A = -5$ and $B = 10$

$\int \frac{x^2+1}{x^2-5x+6}dx = \int dx - 5\int\frac{1}{x-2}dx + 10\int\frac{dx}{x-3}$

$= x - 5\log|x-2| + 10\log|x-3| + C.$

31	Given that $y = 3\cos(\log x) + 4\sin(\log x)$ $\frac{dy}{dx} = \frac{d}{dx}(3\cos(\log x) + 4\sin(\log x)) = -3\sin(\log x).\frac{1}{x} + 4\cos(\log x).\frac{1}{x}$ $\Rightarrow x\frac{dy}{dx} = -3\sin(\log x) + 4\cos(\log x)$ $x\frac{d^2y}{dx^2} + \frac{dy}{dx}.\frac{d}{dx}x = \frac{d}{dx}[-3\sin(\log x) + 4\cos(\log x)]$ $= -3\cos(\log x).\frac{1}{x} - 4\sin(\log x).\frac{1}{x} = -\frac{1}{x}[3\cos(\log x) + 4\sin(\log x)] = -\frac{1}{x}.y$ $\Rightarrow x\frac{d^2y}{dx^2} + \frac{dy}{dx} = -\frac{1}{x}y$ $\Rightarrow x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} = -y$ $\Rightarrow x^2y_2 + xy_1 + y = 0$	
	- OR - $y = x^x$ Taking logarithm on both sides, we have $\log y = x\log x$ $\frac{1}{y}\frac{dy}{dx} = \log x + x \times \frac{1}{x} = 1 + \log x$ $\frac{dy}{dx} = x^x[1 + \log x]$ $\frac{d^2y}{dx^2} = \frac{d(x^x)}{dx}(1 + \log x) + x^x\left[\frac{d}{dx}(1 + \log x)\right]$	$= x^x(1 + \log x)(1 + \log x) + x^x\left[\frac{1}{x}\right]$ $= x^x(1 + \log x)^2 + x^{x-1}$ $\frac{d^2y}{dx^2} - \frac{1}{y}\left(\frac{dy}{dx}\right)^2 - \frac{y}{x}$, we have $x^x(1 + \log x)^2 + x^{x-1} - \frac{1}{x^x}\left(x^x(1 + \log x)\right)^2 - \frac{x^x}{x}$ $x^x(1 + \log x)^2 + x^{x-1} - \frac{1}{x^x} \times x^{2x}(1 + \log x)^2 - x^{x-1}$ $x^x(1 + \log x)^2 - x^x(1 + \log x)^2 = 0$
32	For a relation to be reflexive xRx For real x $xRx \Rightarrow x - x + \sqrt{2} = \sqrt{2}$ $\sqrt{2}$ is an irrational number. $\therefore$ xRx is reflexive. For a relation to be symmetric $xRy = yRx$ For real number x and y $xRy \Rightarrow x - y + \sqrt{2}$ $yRx \Rightarrow y - x + \sqrt{2}$ $\Rightarrow xRy \neq yRx$ $\therefore$The relation is not symmetric.	For a relation to be transitive $xRy = yRz \Rightarrow xRz$ For real numbers x, y and z $x = -\sqrt{2}$, $y = 3\sqrt{2}$, $z = 2$ **[Substitute the values of x, y, and z in realtion]** $xRy \Rightarrow x - y + \sqrt{2} = -\sqrt{2} - 3\sqrt{2} + \sqrt{2}$ $= -3\sqrt{2}$ is an irrational number. $yRz \Rightarrow y - z + \sqrt{2} = 3\sqrt{2} - 2 + \sqrt{2}$ $= 4\sqrt{2} - 2$ is an irrational number $xRz \Rightarrow x - z + \sqrt{2} = -\sqrt{2} - 2 + \sqrt{2}$ $= -2$ is not an irrational number $\therefore$ xRy , yRx then x is not related to z The relation is not transitive.
	- OR -	

$A = \{0,1,2,3,4,5,6,7,8,9,10,11,12\}$

$R = \{(a,b) : a,b \in A, |a-b| \text{ is divisible by } 4\}$

$|a-a| = 0$

0 is a multiple of 4

$\therefore (a,a) \in R$

∴ R is reflexive.

$|a-b| = |b-a|$

If $|a-b|$ is a multiple of 4, then $|b-a|$ is a multiple of 4

Hence if $(a,b) \in R$, then $(b,a) \in R$

∴ R is symmetric.

If $|a-b|$ is a multiple of 4 and $|b-c|$ is a multiple of 4

Then $a - b + b - c$ is a multiple of 4

$a - c$ is a multiple of 4

$|a-c|$ is a multiple of 4

Hence if $(a,b) \in R$ and $(b,c) \in R$ then $(a,c) \in R$

∴ R is transitive.

R is reflexive, symmetric and transitive.

Hence R is an equivalence relation.

Elements related to 1:

{1, 5, 9}

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$\vec{r} = (\hat{\imath} + 2\hat{\jmath} + 3\hat{k}) + \lambda(\hat{\imath} - 3\hat{\jmath} + 2\hat{k})$ and $\vec{r} = (4\hat{\imath} + 5\hat{\jmath} + 6\hat{k}) + \mu(2\hat{\imath} + 3\hat{\jmath} + \hat{k})$

$\vec{a_1} = (\hat{\imath} + 2\hat{\jmath} + 3\hat{k})$

$\vec{b_1} = (\hat{\imath} - 3\hat{\jmath} + 2\hat{k})$

$\vec{a_2} = (4\hat{\imath} + 5\hat{\jmath} + 6\hat{k})$

$\vec{b_2} = (2\hat{\imath} + 3\hat{\jmath} + \hat{k})$

$(\vec{a_2} - \vec{a_1}) = 3\hat{\imath} + 3\hat{\jmath} + 3\hat{k}$

$\vec{b_1} \times \vec{b_2} = -9\hat{\imath} + 3\hat{\jmath} + 9\hat{k}$

$|\vec{b_1} \times \vec{b_2}| = 3\sqrt{19}$

$(\vec{b_1} \times \vec{b_2}).(\vec{a_2} - \vec{a_1}) = 9$

Shortest distance between the lines = $\left|\frac{(\vec{b_1} \times \vec{b_2}).(\vec{a_2} - \vec{a_1})}{|\vec{b_1} \times \vec{b_2}|}\right| = \frac{3}{\sqrt{19}}$

\- OR -

Let $\vec{c} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$

$\vec{a} . \vec{c} = 3$

$x + y + z = 3$

$\vec{a} \times \vec{c} = \vec{b}$

$(z - y)\hat{\imath} + (x - z)\hat{\jmath} + (y - x)\hat{k} = \hat{\jmath} - \hat{k}$

$z - y = 0$

$x - z = 1$

$y - x = -1$

$x + y + z = 3$

Solving, we get

$x = \frac{5}{3}, y = z = \frac{2}{3}$

$\vec{c} = \frac{5\hat{\imath} + 2\hat{\jmath} + 2\hat{k}}{3}$

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x+y+z=10

2x+y=13

x+y=4z

Adj A = $\begin{bmatrix} -4 & 5 & 1 \\ 8 & -5 & 2 \\ 1 & 0 & 1 \end{bmatrix}$

$$\begin{bmatrix}1&1&1\\2&1&0\\1&1&-4\end{bmatrix}\begin{bmatrix}x\\y\\z\end{bmatrix}=\begin{bmatrix}10\\13\\0\end{bmatrix}$$

$\Rightarrow AX = B$, where,

Thus, $X=A^{-1}B$

$|A| = 1(-4-0) - 1(-8-0) + 1(2-1)$

$= -4+8+1 = 5$

$$A^{-1} = \frac{AdjA}{|A|} = \frac{1}{5}\begin{bmatrix}-4&5&1\\8&-5&2\\1&0&1\end{bmatrix}$$

Thus $X=A^{-1}B$

$$\Rightarrow X = \frac{1}{5}\begin{bmatrix}-4&5&1\\8&-5&2\\1&0&1\end{bmatrix}\begin{bmatrix}10\\13\\0\end{bmatrix} = \frac{1}{5}\begin{bmatrix}25\\15\\10\end{bmatrix} = \begin{bmatrix}5\\3\\2\end{bmatrix}$$

$x = 5, y = 3, z = 2$

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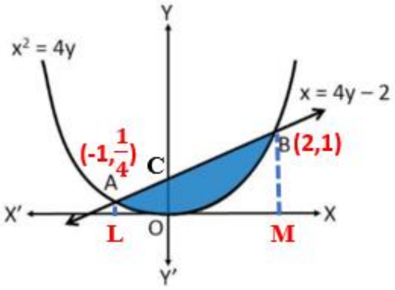

$x = 4y - 2$ & $x^2 = 4y$

$(4y-2)^2 = 4y$

$16y^2 + 4 - 16y = 4y$

$4y^2 - 5y + 1 = 0$

$(4y-1)(y-1) = 0$

$y = \frac{1}{4}, y = 1$

For $y = \frac{1}{4}$

$x = 4y - 2$

$x = 4\left(\frac{1}{4}\right) - 2$

$x = -1$

So, point is $(-1, \frac{1}{4})$

$\therefore \quad A = \left(-1, \frac{1}{4}\right)$

For y = 1

$x = 4y - 2$

$x = 4(1) - 2$

$x = 2$

So, point is (2, 1)

$\therefore \quad B = (2, 1)$

draw AL and BM perpendicular to x-axis

Area $OBAO$ = Area $OBCO$ + Area $OACO$

Area $OBCO$ = Area $OMBC$ − Area $OMBO$

$= \int_0^2 \frac{x+2}{4}\,dx - \int_0^2 \frac{x^2}{4}\,dx$

$= \frac{1}{4}\left[\frac{x^2}{2} + 2x\right]_0^2 - \frac{1}{4}\left[\frac{x^3}{3}\right]_0^2$

$= \frac{1}{4}[2+4] - \frac{1}{4}\left[\frac{8}{3}\right]$

$= \frac{3}{2} - \frac{2}{3} = \frac{5}{6}$

Area $OACO$ = Area $OLAC$ − Area $OLAO$

$= \int_{-1}^{0} \frac{x+2}{4}\,dx - \int_{-1}^{0} \frac{x^2}{4}\,dx$

$= \frac{1}{4}\left[\frac{x^2}{2} + 2x\right]_{-1}^{0} - \frac{1}{4}\left[\frac{x^3}{3}\right]_{-1}^{0}$

$= -\frac{1}{4}\left[\frac{(-1)^2}{2} + 2(-1)\right] - \left[-\frac{1}{4}\left(\frac{(-1)^3}{3}\right)\right]$

$= -\frac{1}{4}\left[\frac{1}{2} - 2\right] - \frac{1}{12} = \frac{1}{2} - \frac{1}{8} - \frac{1}{12} = \frac{7}{24}$

required area $= \left(\frac{5}{6} + \frac{7}{24}\right) = \frac{9}{8}$ sq. units

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i)A polynomial is everywhere differentiable in its domain,

ii) $f(x) = 3x^4 + 4x^3 - 12x^2 + 12$

Differentiating with respect to x, we get

$f'(x) = 12x^3 + 12x^2 - 24x$

$= 12x(x^2 + x - 2)$

$= 12x(x-1)(x+2)$

Now, by putting $f'(x) = 0$, we get $x = -2, 0, 1$

Critical points=-2,0 and 1

iii) $f(x)$ is Increasing in $(-2, 0)$ and in $(1, \infty)$.

so in given interval it is increasing in (-2,0) and (1,3)

OR

iii) max abs=255 at x=3 and min abs=-20 at x=-2

37	$P(x_1, y_1)$ is on the curve $y = x^2 + 7 \Rightarrow y_1 = x_1^2 + 7$ Distance from $p(x_1, x_1^2 + 7)$ and (3, 7) $D = \sqrt{(x_1 - 3)^2 + (x_1^2 + 7 - 7)^2}$ $\Rightarrow \sqrt{(x_1 - 3)^2 + (x_1^2)^2}$ $\Rightarrow D = \sqrt{x_1^4 + x_1^2 - 6x_1 + 9}$ $D = \sqrt{x_1^4 + x_1^2 - 6x_1 + 9}$ $D' = x_1^4 + x_1^2 - 6x_1 + 9$ $\frac{dD'}{dx} = 4x_1^3 + 2x_1 - 6 = 0$ $\frac{dD'}{dx} = 2x_1^3 + x_1 - 3 = 0$ $\Rightarrow (x_1 - 1)(2{x_1}^2 + 2x_1 + 3) = 0$ $x_1 = 1$ and $2x_1^2 + 2x_1 + 3 = 0$ gives no real roots The critical point is (1, 8). $\frac{dD'}{dx} = 4x_1^3 + 2x_1 - 6$ $\frac{d^2D'}{dx^2} = 12x_1^2 + 2$ $\left.\frac{d^2D'}{dx^2}\right]_{x_1=1} = 12 + 2 = 14 > 0$ Hence distance is minimum at (1, 8). $D = \sqrt{x_1^4 + x_1^2 - 6x_1 + 9}$ $D = \sqrt{1 + 1 - 6 + 9} = \sqrt{5}$ units
38	$Required\ Probability = P(A)$ $= P(E_1)P(A/E_1) + P(E_2)P(A/E_2)$ $= \frac{30}{100}.\frac{80}{100} + \frac{70}{100}.\frac{10}{100} = \frac{31}{100}$ $Required\ Probability = P(E_2/A)$ $= \frac{P(E_2)P(A/E_2)}{P(E_1)P(A/E_1) + P(E_2)P(A/E_2)}$ $= \frac{\frac{70}{100}.\frac{10}{100}}{\frac{30}{100}.\frac{80}{100} + \frac{70}{100}.\frac{10}{100}} = \frac{7}{31}$