Q. No. 2 Part (i) (Page 1)

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

$$\frac{d}{dx} f(x) = \frac{d}{dx}\left(\frac{3x+2}{2x-1}\right)$$

$$f'(x) = \frac{(2x-1)\, d/dx(3x+2) - (3x+2)\, d/dx\,(2x-1)}{(2x-1)^2}$$

$$f'(x)$$

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

$$y(2x-1) = 3x+2$$

$$2yx - y = 3x+2$$

$$y(2x-1) = 3x+2$$

$$2y^3 - 3xy^2 + 2x^2y + 5x = 6$$

$$2\frac{d}{dx} y^3 - 3\left[x \frac{d}{dx} y^2 + y^2 \frac{d}{dx} x\right] + 2\left[x^2 \frac{dy}{dx} + y \frac{d}{dx} x^2\right] + 5\frac{d}{dx} x = \frac{d}{dx} 6$$

$$2(3y^2)\frac{dy}{dx} - 3\left[x(2y)\frac{dy}{dx} + y^2\right] + 2\left[x^2\frac{dy}{dx} + 2yx\right] + 5 = 0$$

$$6y^2\frac{dy}{dx} - 6xy\frac{dy}{dx} - 3y^2 + 2x^2\frac{dy}{dx} + 4yx + 5 = 0$$

$$[6y^2 + 2x^2 - 6xy]\frac{dy}{dx} - 3y^2 + 4yx + 5 = 0$$

$$2[3y^2 + x^2 - 3xy]\frac{dy}{dx} = 3y^2 - 4yx - 5$$

$$\frac{dy}{dx} = \frac{3y^2 - 4yx - 5}{6y^2 - 6xy + 2x^2}$$

Q. No. 2 Part (i) (Page 2)

put $x=1$; $y=1$

$$\frac{dy}{dx} = \frac{3(1)^2 - 4(1)(1) - 5}{6(1)^2 - 6(1)(1) + 2(1)^2}$$

$$= \frac{3-4-5}{6-6+2}$$

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

$$\frac{dy}{dx} = -3 \quad \text{. Ans.}$$

CUTTING LINE

Q. No. 2 Part (ii) (Page 1)

continuity at $x = 1$

$$f(x) = \begin{cases} 3x - 1 & \text{if} \quad x < 1 \\ 4 & \text{if} \quad x = 1 \\ 2x & \text{if} \quad x > 1 \end{cases}$$

Left hand limit;

$$\lim_{x \to 1^-} f(x) = \lim_{x \to 1^-} (3x - 1)$$

$$= 3(1) - 1$$

$$= 2$$

Right hand limit;

$$\lim_{x \to 1^+} f(x) = \lim_{x \to 1^+} (2x)$$

$$= 2(1)$$

$$= 2.$$

Exact value function;

$$f(1) = 4$$

since;

$$\text{ie} \lim_{x \to 1^+} f(x) = \lim_{x \to 1^-} f(x) \neq f(1)$$

function is discontinuous at $x = 1$.

Q. No. 2 Part (ii) (Page 2)

Q. No. 2 Part (iii) (Page 1)

$$\lim_{\theta \to 0} \frac{\sec\theta - 1}{\theta \sec\theta}$$

$$= \frac{\sec 0 - 1}{0(\sec 0)} = \frac{\infty}{\infty}$$

so,

$$= \lim_{\theta \to 0} \frac{1/\cos\theta - 1}{\theta \; 1/\cos\theta}$$

$$= \lim_{\theta \to 0} \frac{(1 - \cos\theta)}{\cos\theta} \div \frac{\theta}{\cos\theta}$$

$$= \lim_{\theta \to 0} \frac{1 - \cos\theta}{\cancel{\cos}\theta} \times \frac{\cancel{\cos}\theta}{\theta}$$

$$= \lim_{\theta \to 0} \frac{1 - \cos\theta}{\theta}$$

$$= \lim_{\theta \to 0} \frac{2 \sin^2\theta/2}{\theta}$$

$\times$ in

$$= \lim_{\theta \to 0} \frac{\cancel{2} \sin^2\theta/2}{\cancel{2} \times \theta/2}$$

$$= \lim_{\theta \to 0} \frac{\sin^2\theta/2}{\theta/2}$$

$$= \left(\lim_{\theta \to 0} \frac{\sin\theta/2}{\theta/2} \right) \times \lim_{\theta \to 0} \sin\theta/2$$

$$= (1)(0)$$

$$= 0$$

Q. No. 2 Part (iii) (Page 2)

Q. No. 2 Part (iv) (Page 1)

$f(x) = x^3 - 6x^2 + 9x + 3$

$f'(x) = 3x^2 - 6(2x) + 9$

$= 3x^2 - 12x + 9$

for stationary point;

$f'(x) = 0$

$3x^2 - 12x + 9 = 0$

$x^2 - 4x + 3 = 0$

$x^2 - 3x - x + 3 = 0$

$x(x-3) - 1(x-3) = 0$

$(x-1)(x-3) = 0$

$x = 1$ & $x = 3$.

again differentiat $f'(x)$

$f''(x) = 3(2x) - 12$

$= 6x - 12$ — i)

put $x = 1$

$f''(1) = 6(1) - 12$

$= -6 < 0$

$f(x)$ is maximum at $x = 1$

for maximum value;

$f(1) = (1)^3 - 6(1)^2 + 9(1) + 3$

$= 1 - 6 + 9 + 3$

$f(1) = 7$ is maximum value.

Now,

put $x = 3$ in i)

$f''(3) = 6(3) - 12$

$= 18 - 12$

$= 6 > 0$

$f(x)$ is relative minima at $x = 3$.

Q. No. 2 Part (iv) (Page 2)

for minimum value;

put $x=3$ in $f(x)$

$f(3) = (3)^3 - 6(3)^2 + 9(3) + 3$

$= 27 - 54 + 27 + 3$

$= -51$ is the minimum value.

CUTTING LINE

Q. No. 2 Part (v) (Page 1)

$y = x^3 - 9x$

$x^3 - 9x = 0$

$x(x^2 - 9) = 0$

$x = 0$ & $x^2 - 9 = 0$

$(x+3)(x-3) = 0$

$x = -3 \ ; \ x = 3.$

x	-3	-2	-1	0	1	2	3
y	0	10	8	0	-8	-10	0

Area above x-axis

$\forall \ x \in [-3, 0] \ , \ y \ \exists \ y \geq 0 .$

Area below x-axis

$\forall \ x \in [1, 3] \ , \ \exists \ y \leq 0$

$$\text{Area} = \int_{-3}^{0} (x^3 - 9x)\,dx - \int_{1}^{3} (x^3 - 9x)\,dx$$

$$= \frac{x^4}{4}\Big|_{-3}^{0} - \frac{9x^2}{2}\Big|_{-3}^{0} - \frac{x^4}{4}\Big|_{1}^{3} + \frac{9x^2}{2}\Big|_{1}^{3}$$

$$= \left[\frac{0}{4} - \frac{(-3)^4}{4}\right] - \frac{9}{2}\left[0^2 - (-3)^2\right] - \left[\frac{(3)^4}{4} - \frac{(1)^4}{4}\right] + \frac{9}{2}\left[(3)^2 - (1)^2\right]$$

$$= \frac{81}{4} - \frac{9}{2}[-9] - [20] + \frac{9}{2}[8]$$

$$= \frac{81}{4} + \frac{81}{2} - 20 + 36$$

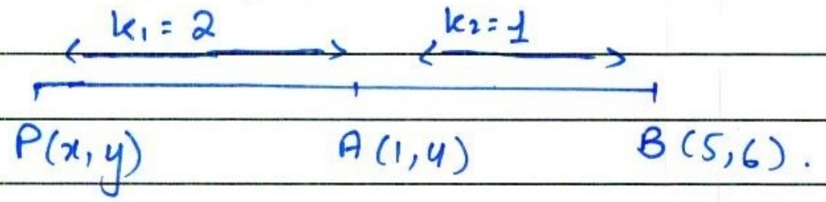
$$= \frac{307}{4} \text{ sq units.}$$

Q. No. 2 Part (v) (Page 2)

Q. No. 2 Part (vi) (Page 1)

let $P(x, y)$

$A(1,4)$; $B(5,6)$.



$$A(1,4) = \left(\frac{k_2x_1 + k_1x_2}{k_2+k_1}, \frac{k_2y_1 + k_1y_2}{k_2+k_1}\right)$$

$$(1,4) = \left(\frac{1(x) + 2(5)}{1+2}, \frac{1(y)+2(6)}{1+2}\right)$$

$$(1,4) = \left(\frac{x+10}{3}, \frac{y+12}{3}\right)$$

$\frac{x+10}{3} = 1$; $\frac{y+12}{3} = 4$

$x+10 = 3$; $y+12 = 12$

$x = 3-10$; $y = 12-12$

$x = -7$ $y = 0$

$P(-7, 0)$.

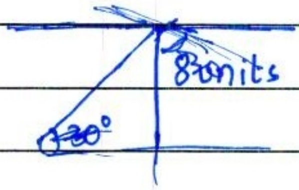
Q. No. 2 Part (vi) (Page 2)

Q. No. 2 Part (vii) (Page 1)

$\theta = 30^\circ$

perpendicular $= 8$

Origin $(0,0)$.



$m = \tan\theta$

$m = \tan 30^\circ$

$m = \dfrac{\sqrt{3}}{3}$

$m = \dfrac{1}{\sqrt{3}}$ = slope.

$\sin 30^\circ = \dfrac{8}{hyp}$

$hyp = 16$; $h^2 = P^2 + b^2$

$16^2 - 8^2 = b^2$

$b^2 = 192$

$b = 8\sqrt{3}$.

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

$y - 0 = \dfrac{1}{\sqrt{3}}(x - 0)$

$y = \dfrac{1}{\sqrt{3}}x$

$\dfrac{1}{\sqrt{3}}x - y = 0$.

put $x = 0$ for y-intercept,

$y = 0$ $(0,0)$.

y-intercept $= 8\sqrt{3}$.

Q. No. 2 Part (vii) (Page 2)

CUTTING LINE

Q. No. 2 Part (viii) (Page 1)

$3x + 2y \geq 6$; $x + y \leq 4$; $x \geq 0$; $y \geq 0$

$3x + 2y > 6$; $x + y < 4$

$3x + 2y = 6$; $x + y = 4$

put $x = 0$; ; $x = 0$;

$2y = 6$; $y = 4$ $(0,4)$

$y = 3$ $(0,3)$; $y = 0$;

put $y = 0$; ; $x = 4$ $(4,0)$

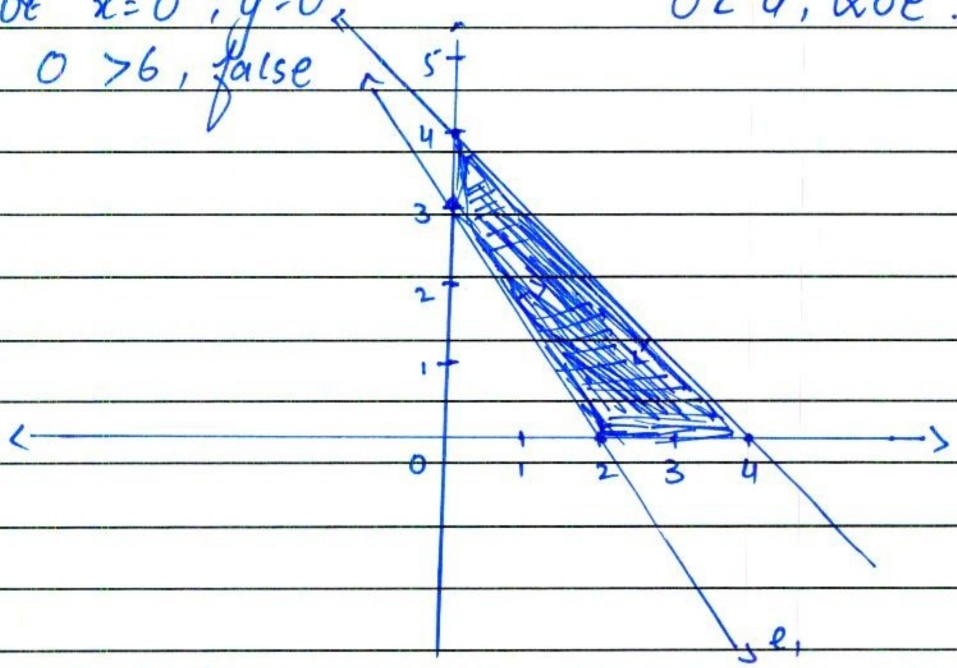
$3x = 6$;

$x = 2$ $(2,0)$ origin test;

origintest; ; $0+0 < 4$

put $x = 0$; $y = 0$, $0 < 4$, true.

$0 > 6$, false



corner points;

$(0,3)$, $(0,4)$, $(2,0)$ & $(4,0)$.

Q. No. 2 Part (viii) (Page 2)

Q. No. 2 Part (ix) (Page 1)

$5x + 7y \leq 35$; $x - 2y \leq 4$; $x \geq 0$; $y \geq 0$

$5x + 7y = 35$

$x = 0$;

$7y = 35$

$y = 5$ $(0,5)$

$y = 0$;

$5x = 35$

$x = 7$ $(7,0)$

origin test;

$0 < 35$, true

$x - 2y = 4$

$x = 0$;

$-2y = 4$

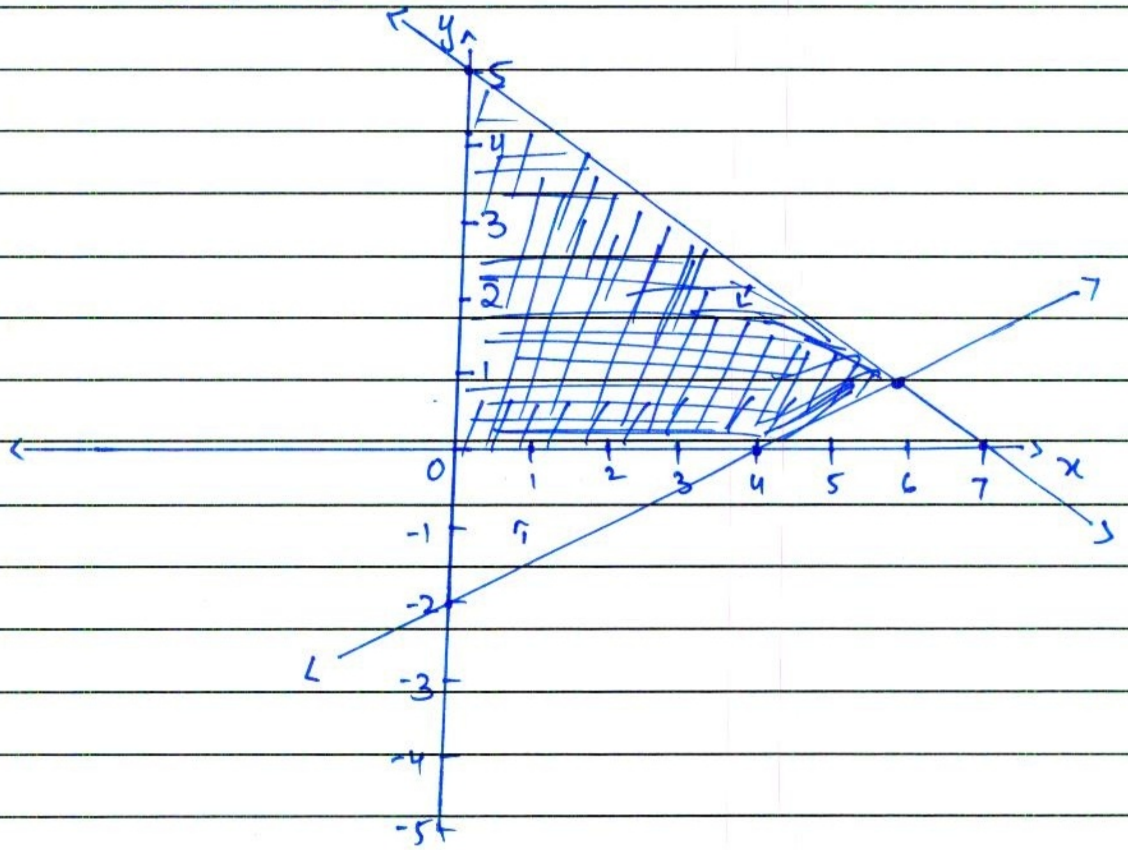
$y = -2$ $(0,-2)$

$y = 0$;

$x = 4$ $(4,0)$

origin test

$0 < 4$, true.



corner points $(0,0)$, $(0,5)$, $(98/17, 15/17)$

$$\begin{aligned} 5x + 7y &= 35 \\ -5x + 10y &= -20 \\ \hline 17y &= 15 \end{aligned}$$

$\Rightarrow y = 15/17$

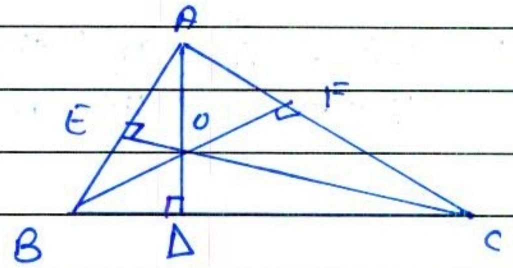
$x - 2(15/17) = 4$

$x = 98/17$

Q. No. 2 Part (ix) (Page 2)

CUTTING LINE

Q. No. 2 Part (x) (Page 1)



let a ΔABC. let a, b, c be the position vectors of A, B, & C.
The altitudes are shown in figure.

as,

$$\vec{AD} \perp \vec{BC}$$
$$\vec{AD} \cdot \vec{BC} = 0$$
$$OA \cdot (\underline{c} - \underline{b}) = 0$$
$$\underline{a} \cdot (\underline{c} - \underline{b}) = 0$$
$$\underline{a} \cdot \underline{c} - \underline{a} \cdot \underline{b} = 0$$
$$\underline{a} \cdot \underline{c} = \underline{a} \cdot \underline{b} \quad \text{- i)}$$

also,

$$\bar{CE} \perp \vec{AB}$$
$$\bar{OE} \perp \vec{AB}$$
$$\bar{OC} \perp \vec{AB}$$
$$\bar{OC} \cdot \bar{AB} = 0$$
$$\underline{c} \, (\underline{b} - \underline{a}) = 0$$
$$\underline{c} \cdot \underline{b} - \underline{c} \cdot \underline{a} = 0$$
$$\underline{c} \cdot \underline{b} = \underline{a} \cdot \underline{c} \quad \text{- ii)}$$

from i) & ii)

$$\underline{a} \cdot \underline{b} = \underline{c} \cdot \underline{b}$$
$$\underline{a} \cdot \underline{b} - \underline{c} \cdot \underline{b} = 0$$
$$\underline{b} \, (\underline{a} - \underline{c}) = 0$$
$$\vec{OB} \cdot (\vec{CA}) = 0$$
$$\vec{OB} \perp \vec{CA}$$
$$\vec{OF} \perp \vec{CA}$$
$$\vec{BF} \perp \vec{CA}$$

Q. No. 2 Part (x) (Page 2)

as $\vec{BF} \perp \vec{CA}$ and it passes through O.
The altitudes of a triangle are concurrent.

Q. No. 2 Part (xi) (Page 1)

~~$\underline{u} = 2\underline{i} + 3\underline{j} + 4\underline{k}$~~
~~$\underline{v} = \underline{i} + 4\underline{j} + 3\underline{k}$~~
~~$\underline{\omega} = \underline{i} + 7\underline{j} + \lambda\underline{k}$~~
~~as, they represent a triangle~~
~~$\underline{u} + \underline{v} = \underline{\omega}$~~
~~$(2\underline{i} + 3\underline{j} + 4\underline{k}) + (\underline{i} + 4\underline{j}$~~

$\frac{x^2}{18} + \frac{y^2}{8} = 1$; $\frac{x^2}{3} - \frac{y^2}{3} = 1$

$8x^2 + 18y^2 = 144$ - i) ; $x^2 - y^2 = 3$ - ii)

; $x^2 = 3 + y^2$

~~put $x^2 = 3+$~~

multiply ii) with 18 and add to i)

$$18x^2 - 18y^2 = 54$$
$$+ \quad 8x^2 + 18y^2 = 144$$
$$26x^2 = 198$$
$$x^2 = \frac{99}{13}$$
$$x = \pm\sqrt{\frac{99}{13}}$$

put in ii)

$$\frac{99}{13} - y^2 = 3$$
$$\frac{99}{13} - 3 = y^2$$
$$y^2 = \frac{60}{13}$$

Q. No. 2 Part (xi) (Page 2)

$$y = \pm\sqrt{\frac{60}{13}}$$

so,

intersection of conics is at;

$$\left(\pm\sqrt{\frac{99}{13}}, \pm\sqrt{\frac{60}{13}}\right)$$

CUTTING LINE

Q. No. 2 Part (xii) (Page 1)

$O[1,1,1]$, $P[2,0,1]$

$\bar{F}_1 = \underline{i} - 2\underline{j}$

$\bar{F}_2 = 3\underline{i} + 2\underline{j} - \underline{k}$

$\bar{F}_3 = 5\underline{j} + 2\underline{k}$

$\underline{F} = \bar{F}_1 + \bar{F}_2 + F_3$

$\bar{F} = \underline{i} - 2\underline{j} + 3\underline{i} + 2\underline{j} - \underline{k} + 5\underline{j} + 2\underline{k}$

$\bar{F} = 4\underline{i} + 5\underline{j} + \underline{k}$

Torque $= r \times F$

$r = \vec{OP}$

$= [2,0,1] - [1,1,1]$

$r = [1,-1,0]$

Torque $= [1,-1,0] \times [4,5,1]$

$$= \begin{vmatrix} \underline{i} & \underline{j} & \underline{k} \\ 1 & -1 & 0 \\ 4 & 5 & 1 \end{vmatrix}$$

$$= \underline{i} \begin{vmatrix} -1 & 0 \\ 5 & 1 \end{vmatrix} - \underline{j} \begin{vmatrix} 1 & 0 \\ 4 & 1 \end{vmatrix} + \underline{k} \begin{vmatrix} 1 & -1 \\ 4 & 5 \end{vmatrix}$$

$= \underline{i}\,(-1-0) \underline{j}\,(1-0) + \underline{k}\,(5+4)$

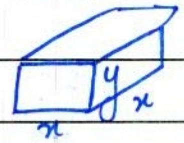
Torque $= -\underline{i} - \underline{j} + 9\underline{k}$

Q. No. 2 Part (xii) (Page 2)

CUTTING LINE

Q. No. 3 (Page 1)

let base $= x$; depth $= y$



Volume $= x \times x \times y$

$V = x^2 y$

$32 = x^2 y$

$y = 32/x^2$

Now,

surface area = area of base + sum of 4 walls

$= x^2 + 4xy$

$f(x) = x^2 + 4x\left(\frac{32}{x^2}\right)$

$f(x) = x^2 + 128/x$

$f'(x) = 2x - \frac{128}{x^2}$

for stationary point;

$2x - 128/x^2 = 0$

$2x^3 - 128 = 0$

$2x^3 = 128$

$x^3 = 64$

$x = 4$

$f''(x) = 2 - 128(-2)(x^{-3})$

$= 2 + \frac{256}{x^3}$

put $x = 4$ in $f''(x)$

$f''(4) = 2 + 256/64$

$= 2 + 4$

$= 6 > 0$

$f(x)$ is minima at $x = 4$

for minimum value;

$f(4) = (4)^2 + \frac{128}{4} = 48$ is the least value.

Q. No. 3 (Page 2)

$$y = \frac{32}{4^2}$$

$$y = 2.$$

$$y_x = 4$$

$$x = 4$$

are dimensions of box.

CUTTING LINE

Q. No. 3 (Page 3)

Q. No. 3 (Page 4)

Q. No. 4 (Page 1)

$$\frac{x^2}{128} + \frac{y^2}{18} = 1$$

parallel to

$3x + 8y + 1 = 0$

slope of line $= m_1 = \frac{-3}{8}$ = slope of tangent

from ellipse;

$a^2 = 128 \quad ; \quad b^2 = 18$

$a = \pm 8\sqrt{2} \quad ; \quad b = \pm 3\sqrt{2}$

$c^2 = a^2 - b^2$

$c^2 = 128 - 18$

$c^2 = 110$

$c = \pm\sqrt{110}$

equation of tangent;

$y = mx \pm \sqrt{a^2m^2 + b^2}$

$y = \frac{-3}{8}x \pm \sqrt{(128)\left(\frac{-3}{8}\right)^2 + 18}$

$y = \frac{-3}{8}x \pm \sqrt{18+18}$

$= \frac{-3}{8}x \pm \sqrt{36}$

$y = \frac{-3}{8}x \pm 6$

$\frac{3}{8}x + y \pm 6 = 0$

$3x + 8y \pm 48 = 0 \rightarrow$ be a equation of tangent.

Q. No. 4 (Page 2)

point of contact

$3x + 8y \pm 48 = 0$

$3x = -8y \pm 48$

$x = \frac{-8y \pm 48}{3}$; put in ellipse

$\frac{(-8y \pm 48)^2}{3^2} \div 128 + \frac{y^2}{18} = 1$

$\frac{64y^2 + 2304}{9 \times 128} + \frac{y^2}{18} = 1$

$\frac{64y^2 + 2304}{1152} + \frac{y^2}{18} = 0$

$18(64y^2 + 2304) + 1152y^2 = 0$

$2304y^2 + 41472 = 0$

$y^2 = -18$

$y = \pm 3\sqrt{2}.$

$x = 16 \pm 8\sqrt{2}$; $x =$

$(16 \pm 8\sqrt{2}, \pm 3\sqrt{2})$

Q. No. 4 (Page 3)

Yele P(x_T

Q. No. 4 (Page 4)

CUTTING LINE

Q. No. 5 (Page 1)

let lights $= x$ & fans $= y$.

$5x + 4y \leq 120$

$4x + 8y \leq 144$

$f(x) = 50x + 80y$.

$5x + 4y \leq 120$; $4x+8y \leq 144$

$5x + 4y = 120$; $4x+8y = 144$

$x = 0$; ; $x = 0$;

$4y = 120$; $8y = 144$

$y = 30$ $(0,30)$; $y = 18$ $(0,18)$

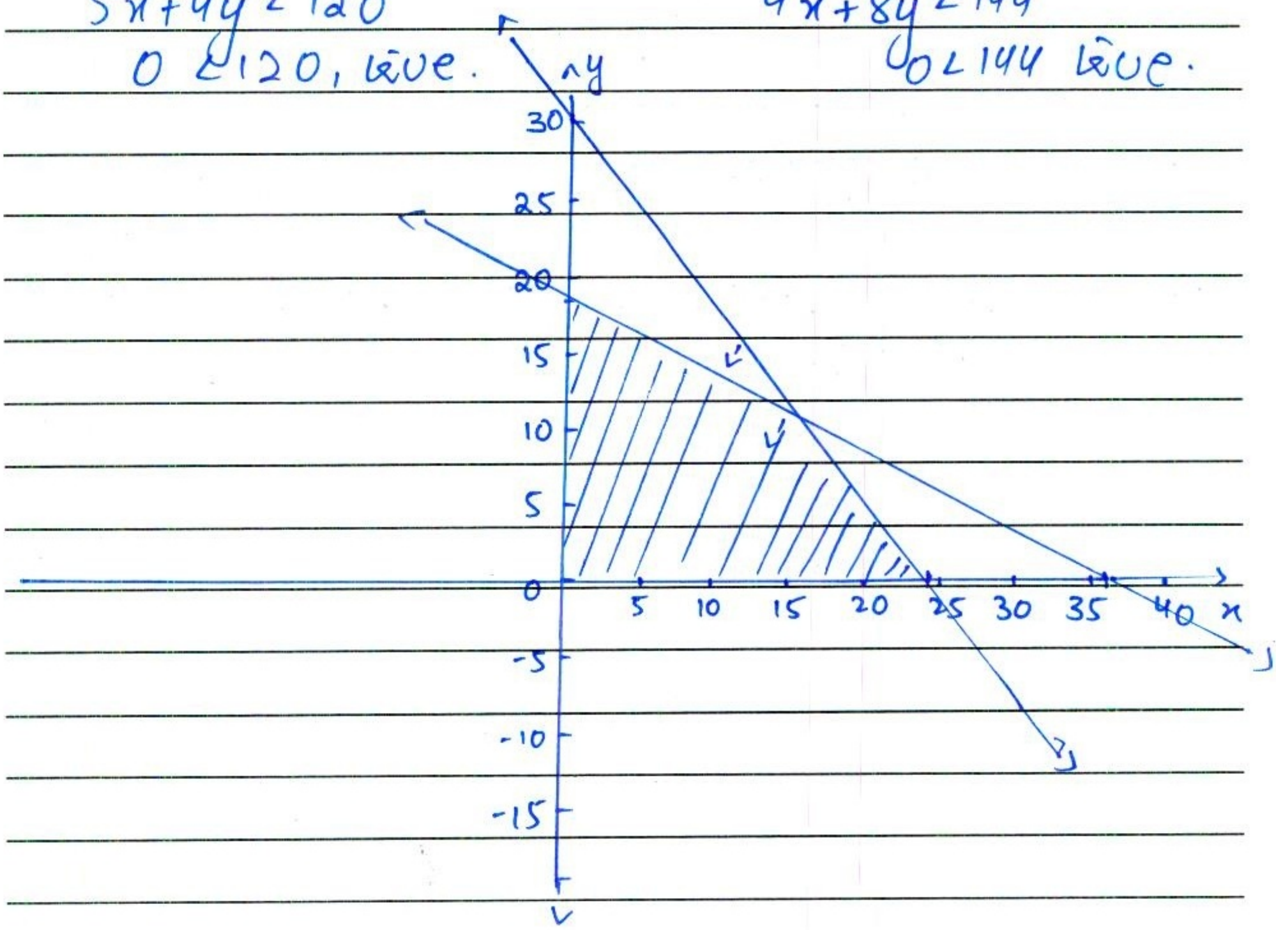
$y = 0$; ; $y = 0$;

$5x = 120$; $4x = 144$

$x = 24$ $(24,0)$; $x = 36$ $(36,0)$

$5x+4y < 120$; $4x+8y < 144$

$0 < 120$, true. ; $0 < 144$ true.



Q. No. 5 (Page 2)

corner points
$(0,18), (24,0), (0,0), (16,10)$

$$4x+8y = 144$$
$$-10x-8y = -240$$
$$-6x = -96$$
$$\therefore x = 16$$

so,
$$5(16)+4y = 120$$
$$4y = 40$$
$$y = 10$$

for max profit.
$f(x) = 50x + 80y.$

$(0,8) \Rightarrow 50(0)+80(8) = 640$
$(24,0) \Rightarrow 50(24)+80(0) = 1200$
$(0,0) \Rightarrow 50(0)+80(0) = 0$
$(16,10) \Rightarrow 50(16)+80(10) = 1600 \rightarrow$ maximum

for maximum profit, 16 lights & 10 fans should be manufactured.

Q. No. 5 (Page 3)

Q. No. 5 (Page 4)

CUTTING LINE

Q. No. 6 (Page 1)

$$9x^2 - y^2 - 12x - 2y + 2 = 0$$

$$(3x)^2 - 2(3x)(2) + (2)^2 - (2)^2 - [(y)^2 + 2(y)(1) + (1)^2 - (1)^2] = -2$$

$$(3x-2)^2 - 4 - (y+1)^2 + 1 = -2$$

$$(3x-2)^2 - (y-1)^2 = -2+3$$

$$(3x-2)^2 - (y-1)^2 = 1$$

$$[3\,[x-2/3)\cancel{8}\,]^2 - (y-1)^2 = 1$$

$$9\,(x-2/3)^2 - (y-1)^2 = 1$$

$$\frac{(x-2/3)^2}{1/9} - \frac{(y-1)^2}{1} = 1 \quad \text{-i)}$$

$a^2 = 1/9$; $b^2 = 1$

$a = \pm \frac{1}{3}$; $b = 1$

$$c^2 = a^2 + b^2$$

$$c^2 = 1/9 + 1$$

$$c^2 = 10/9$$

$$c = \pm \sqrt{10}/3.$$

foci $(\pm c, 0)$

let $x - 2/3 = X$; $y - 1 = Y$

then i) becomes.

$$\frac{X^2}{1/9} - Y^2 = 1.$$

foci $(\pm c, 0)$

$x - 2/3 = \pm \frac{\sqrt{10}}{3}$; $y - 1 = 0$

$x = \cancel{\pm}\frac{2}{3} \pm \frac{\sqrt{10}}{3}$; $y = 1$

Q. No. 6 (Page 2)

foci $\left(\frac{2}{3} \pm \frac{\sqrt{10}}{3}, 1\right)$

vertices $(\pm a, 0)$

$\frac{x-2}{3} = \pm\frac{1}{3}$; $y-1=0$

$x = \frac{2}{3} \pm \frac{1}{3}$; $y = 1$

$x = 1$; $x = 1/3$

vertices $(1, 1)$; $(1/3, 1)$.

centre $(0, 0)$

$x - 2/3 = 0$; $y-1=0$

$x = 2/3$; $y = 1$

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

eccentricity $= c/a$

$= \pm\frac{\sqrt{10}}{3} \div \frac{1}{3}$

$e = \pm\sqrt{10}$

DTX $x = \pm c/e^2$

$= \pm\frac{\sqrt{10}}{3} \div (10)$

$= \pm\frac{\sqrt{10}}{3 \times 10}$

$x = \pm\frac{1}{3\sqrt{10}}$ $\Rightarrow x \pm \frac{1}{3\sqrt{10}} = 0$.

Q. No. 6 (Page 3)

Q. No. 6 (Page 4)

Graph Page No. 1

$5x + 2y + c = 0$

$F(\pm\sqrt{110}, 0)$

$PF + |PF'| = 2a$

$\frac{(5)^2}{4} - \frac{(2)^2}{9} = 1 \quad \frac{x^2}{4} - \frac{y^2}{9} = 1$

$\frac{25}{4} - \frac{4}{9} = 1 \quad \frac{(5)^2}{4}$

$a^2 = 4 \quad a = \pm 2$

$b^2 = 9 \quad b = \pm 3$

$m = 1/\sqrt{3}\, x$

$c = a/m/2$

$5x = c$

$x = -c/5$

$P(x, y)$

$3x + 8y \pm 48 = 0$

$c^2 = a^2 + b^2$

$= 4 + 9$

$c^2 = 13$

$c = \sqrt{13}$

$3x + 8y + 1$

$y = mx + c$

$3x + 8y + 48 = 0$

$y = 8 \quad m = \frac{1}{\sqrt{3}}x + c$

$b = 8 \quad y = \frac{1}{\sqrt{3}}$

$x + x = 0$

$\sqrt{3}y$

$x = 8 \cdot x - 8 = 0$

$3x + 8y \pm 48 = 0$

$3x + 8y + 48 = 0$

$3x + 8y$

8m.

$(x - a)^2$

$\left(\sqrt{(x - \sqrt{110})^2 + (y)^2}\right) = 2a - \sqrt{(x + \sqrt{110})^2 + (y)^2}$

$x^2 + 110 - 2\sqrt{110}x + y^2 = 4a^2 + (x + \sqrt{110})^2 + y^2$

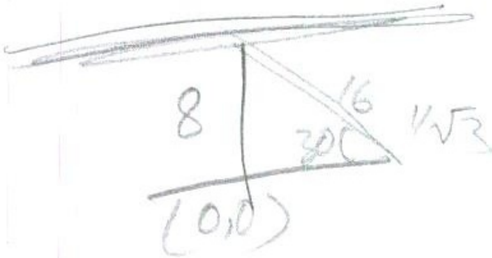
$\cancel{x^2} + \cancel{110} - 2\sqrt{110}x + \cancel{y^2} = 4a^2 + \cancel{x^2} + \cancel{110} + 2\sqrt{110}x + \cancel{y^2}$

$0 = 4\sqrt{110}x + 4(128)$

$= \sqrt{110}x + 128 \quad \sqrt{110}x = -128$

$x = \frac{-64\sqrt{110}}{55}$

CUTTING LINE



$$m = \frac{1}{\sqrt{3}}$$

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

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

$$y - y_1 = \frac{1}{\sqrt{3}}(x - x_1)$$

$$\cos 2\theta = \cos^2\theta - \sin^2\theta$$

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

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

$$x = [1, 1, 1] - [2, 0, 1]$$

$$x = [-1, 1, 0].$$

$$\begin{matrix} i & j & k \\ -1 & 1 & 0 \\ 4 & 5 & 1 \end{matrix}$$

$$i\begin{vmatrix} 1 & 0 \\ 5 & 1 \end{vmatrix} - j\begin{vmatrix} -1 & 0 \\ 4 & 1 \end{vmatrix} + k\begin{vmatrix} -1 & 1 \\ 4 & 5 \end{vmatrix}$$

$$i(1-0) - j(-1-0) + k(-5-4)$$

$$i + j - 9k$$

$f(x) = e^{\ln \sin x}$

$= e^{\ln \sin x} \frac{d}{dx} \ln \sin x$

$= e^{\ln \sin x} \cdot \frac{1}{\sin x} \cos x$

$e^{\ln \sin x} \cot x$

$\begin{vmatrix} 3 & -1 & 1 \\ 5 & a & 1 \\ 2 & 1 & 1 \end{vmatrix} = 0$

$3 \begin{vmatrix} a & 1 \\ 1 & 1 \end{vmatrix} + 1 \begin{vmatrix} 5 & 1 \\ 2 & 1 \end{vmatrix} + 1 \begin{vmatrix} 5 & a \\ 2 & 1 \end{vmatrix}$

$3(a-1) + 1(5-2) + 1(5-2a)$

$3a - \cancel{3} + \cancel{3} + 5 - 2a$

$a + 5$

$f(x) = \cos x - \frac{x}{2}$

$= \cos(-x) + \frac{x}{2}$

$f(x) = 1 - \cos x$

$4 - 4 = 0$

$f(x) = 2\ln(x^2+1)$

$= \frac{2}{x^2+1} \times 2x + 0$

$= \frac{1}{2} \ln(x^2+1) +$

$\frac{1}{2} \frac{(2x)}{(x^2+1)} + C$

$= \frac{x}{x^2+1}$

$\cot \pi/2$

$= e^{\ln 1} \cot 0/0$

$f(0) = \frac{1}{2} e$

$= e^0$

$x + y = \sin(x+y)$

$\frac{dx}{dx} + \frac{dy}{dx} = \frac{d}{dx} \sin(x+y)$

$1 + \frac{dy}{dx} = \cos(x+y) \frac{d(x+y)}{dx}$

$(1 + dy/dx) = (\cos x + y)(1 + dy/dx)$

$\cos x + y = 1$

$-\cos x = y$

$\frac{dy}{dx} = -$

$f(x) = \ln(x^2+1) + 1$

$= \frac{1}{x^2+1}$

$\frac{2\sqrt{3}\, i + j + k}{\sqrt{4}}$

$= \frac{\sqrt{3}}{2} i + \frac{j}{2} + \frac{k}{2}$

$\sqrt{3}\, i - \sqrt{3}\, j + \sqrt{3}\, k$

$\pi x - \sqrt{2} y + \sqrt{7}$

$kx + 3y + 2 = 0$

$m = -\pi / -\sqrt{2}$

$-k/3 \cdot \pi/\sqrt{2} = -1$

$= \frac{\pi}{\sqrt{2}}$

$m_2 = \frac{-k}{3}$

$-\frac{k}{3} = \frac{-\sqrt{2}}{\pi}$

$\int_0^{\pi/2} \cos x (e^{\sin x}) dx$

$= \cos x \int e^{\sin x} - \int \frac{e^{\sin x} - \sin x}{?} dx$

$= \frac{\cos x\, e^{\sin x}}{\sin x} - \int \frac{e^{\sin x}(-\sin x)}{\sin x} dx$

$= \cot x\, e^{\sin x} + \int e^{\sin x} dx$

$= \cot x\, e^{\sin x} + \frac{e^{\sin x}}{\sin x}$

$\int_0^2 (x - k) dx = 1$

$\int x\, dx - k \int dx = 1$

$\frac{x^2}{2}\Big|_0^2 - kx\Big|_0^2 = 1$

$(4/2 - 0) - (\frac{(2)}{2} - 0)$

$(4/2 - 2/2)$

$2 - 1 = 1$

$1 = 1$

$f(x) = x^2 + 2x - 3$

$= 2x + 2$

$2x + 2 = 0$

$2x = -2$

$x = -1$

$k = -\frac{3\sqrt{2}}{\pi}$

$k = \frac{3\sqrt{2}}{\pi}$

$f''(x) = 2$

$f''(-1) = 2$

$f(-1) = (-1)^2 + 2(-1) - 3$

$= 1 - 2 - 3$

$= 1 - 5$

$= -4$

$f(x) = \sqrt{x+5}$

$f(g(x)) = 3x$

$f(3x^2 - 5) = \sqrt{3x^2 - 5 + 5}$

$= \sqrt{3x^2}$

$= \sqrt{3}\, x$

$f(9x^2 - 5) = \sqrt{9x^2 - 5 + 5}$

$= \sqrt{9x^2}$

$= 3x$

$= [\infty - 0] + [e - 1/0]$

$= \infty - e + e - \infty$

$= e$

$\infty - e - \infty$

$a = 1$

$2h = 2$

$h = 1$

$\tan\theta = 2\frac{\sqrt{1^2 - (1)(-1)}}{1 - 1}$

$= \frac{2\sqrt{1+1}}{}$

$= \frac{2\sqrt{2}}{0} =$

$= [\cot \pi/2\, e^{\sin \pi/2} - \cot 0\, e^{\sin 0}] + [\frac{e^{\sin \pi/2}}{\sin \pi/2} - \frac{e^{\sin 0}}{\sin 0}]$