03

متعلقہ سوال کا جواب صرف مختص کردہ جگہ پر اور بیرونی نشان کے اندر دیا جائے۔

22741234

(Section B)

Q. No. 2 (i) (Page 1/2) $f(x) = \sqrt{x^3+4}$

let $y = f(x)$

$x = f^{-1}y \rightarrow i)$

now

$y = \sqrt{x^3+4} \rightarrow ii)$ taking square on both sides of ii)

$y^2 = x^3+4$

$y^2 - 4 = x^3$

$(y^2-4)^{1/3} = x$

now from i)

$(y^2-4)^{1/3} = f^{-1}(y)$

Replace y by x

$(x^2-4)^{1/3} = f^{-1}(x)$

now To Prove $: f(f^{-1}(x)) = x$.

$\rightarrow f \circ f^{-1}(x) = f(f^{-1}(x)) = f(x^2-4)^{1/3} = \sqrt{((x^2-4)^{1/\cancel{3}})^{\cancel{3}}+4}$

$= \sqrt{x^2 \cancel{-4} \cancel{+4}} = \sqrt{x^2} = \boxed{x}$

$f^{-1}(f(x)) = f^{-1}(f(x)) = f^{-1}(\sqrt{x^3+4}) = ((\sqrt{x^3+4})^2 - 4)^{1/3}$

$= (x^3 \cancel{+4} \cancel{-4})^{1/3} = x$

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

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

Evaluate $\lim_{x \to 0} \frac{\operatorname{cosec} x - \cot x}{x}$

$= \lim_{x \to 0} \frac{1}{x} \left(\operatorname{cosec} x - \cot x \right)$

$= \lim_{x \to 0} \frac{1}{x} \left(\frac{1}{\sin x} - \frac{\cos x}{\sin x} \right)$

$= \lim_{x \to 0} \frac{1}{x} \left(\frac{1 - \cos x}{\sin x} \right)$

$= \lim_{x \to 0} \frac{1}{x} \left(\frac{\cancel{2} \sin^2 x/2}{\cancel{2} \sin \frac{x}{2} \cos \frac{x}{2}} \right)$ $\quad \therefore \cos 2x = 1 - 2\sin^2 x$

$\therefore \sin 2x = 2 \sin x \cos x$

$\therefore \sin x = 2 \sin \frac{x}{2} \cos x/2$

$= \lim_{x \to 0} \frac{1}{x} \left(\frac{\sin x/2}{\cos x/2} \right)$

$= \lim_{x \to 0} \left(\frac{\sin x/2}{x} \cdot \frac{1}{\cos x/2} \right)$

$= \lim_{x \to 0} \left(\frac{\sin^{x/2}}{x} \cdot \frac{1}{\cos x/2} \right)$

multiplying by and dividing by 2.

$= \lim_{x \to 0} \frac{\sin x/2}{\frac{x}{2} \cdot 2} \cdot \frac{1}{\cos x/2}$

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

Applying the limit.

$= 1 \cdot \dfrac{1}{2\cos(0)}$

$= \dfrac{1}{2}$

$\dfrac{\operatorname{cosec} x - \cot x}{x} = \frac{1}{2}$

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

$y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \cdots \infty}}}$

To prove

$(2y-1)\frac{dy}{dx} = \cos x$

$y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \cdots\cdots \infty}}} \rightarrow i)$

taking square on both sides

$y^2 = \left(\sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \cdots \infty}}}\right)^2$

$y^2 = \sin x + \sqrt{\sin x + \sqrt{\sin x + \cdots \infty}}$

$y^2 = \sin x + y \rightarrow ii) \quad \therefore (\text{from } i)$

differentiating eq ii) w.r.t x.

$\frac{d}{dx}(y^2) = \frac{d}{dx}(\sin x) + \frac{dy}{dx}.$

$2y\frac{dy}{dx} = \cos x + \frac{dy}{dx}.$

$2y\frac{dy}{dx} - \frac{dy}{dx} = \cos x$

$\boxed{\frac{dy}{dx}(2y-1) = \cos x}$

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

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

$$\sin(x+h) = \sin x + h\cos x - \frac{h^2}{2!}\sin x - \frac{h^3}{3!}\cos x + \ldots$$

~~(let f(x+h))~~

As we know by taylor series

$$f(x+h) = f(x) + h f'(x) + \frac{h^2}{2!} f''(x) + \frac{h^3}{3!} f'''(x) \rightarrow i)$$

now here

$$f(x) = \sin x \rightarrow ii)$$

$$f'(x) = \frac{d}{dx}\sin x$$

$$f'(x) = \cos x \rightarrow iii)$$

$$f''(x) = \frac{d}{dx}(\cos x)$$

$$f''(x) = -\sin x \rightarrow iv)$$

$$f'''(x) = \frac{d}{dx}(-\sin x)$$

$$= -\cos x \rightarrow v)$$

put ii), iii), iv and v in i)

$$\cancel{f(}\ \sin(x+h) = \sin x + h\cos x + \frac{h^2}{2!}(-\sin x) + \frac{h^3}{3!}(-\cos x)$$

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

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

$y = \sin^{-1}\frac{x}{a}$

To show $y_2 = x(a^2 - x^2)^{-3/2}$

$y = \sin^{-1}\frac{x}{a} \rightarrow i)$

differentiate eq i) w.r.t x.

$\frac{dy}{dx} = \frac{d}{dx}\left(\sin^{-1}\frac{x}{a}\right)$

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

$y_1 = \frac{1}{\sqrt{1-\frac{x^2}{a^2}}}\cdot\frac{1}{a}$

$= \frac{1}{\sqrt{\frac{a^2-x^2}{a^2}}}\cdot\frac{1}{a}$

$= \frac{\cancel{a}}{\sqrt{a^2-x^2}}\cdot\frac{1}{\cancel{a}}$

$y_1 = \frac{1}{\sqrt{a^2-x^2}} \rightarrow ii)$

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

$$y_2 = \frac{d}{dx}\left(\frac{1}{\sqrt{a^2-x^2}}\right)$$

$$= \frac{d}{dx}\left((a^2-x^2)^{-1/2}\right)$$

$$= \frac{1}{2}(a^2-x^2)^{-1/2-1}\frac{d}{dx}(a^2-x^2)$$

$$= \frac{-1}{\cancel{2}}(a^2-x^2)^{-3/2}(-\cancel{2}x)$$

$$y_2 = +x(a^2-x^2)^{-3/2}$$

hence proved

$$y_2 = x(a^2-x^2)^{-3/2}$$

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

$= \int \frac{1}{3x(\ln 3x)^4} dx$

let $\ln 3x = t$

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

Now

$\int \frac{1}{3x(\ln 3x)^4} dx = \int \frac{dt}{t^4}$

$= \int t^{-4} dt$

$= \frac{t^{-4+1}}{-4+1} + c$

$= \frac{t^{-3}}{-3} + c$

$= \frac{-1}{3}(t^{-3}) + c$

$= \frac{-1}{3}(\ln 3x)^{-3} + c$

$\int \frac{1}{3x(\ln 3x)^4} dx = \frac{-1}{3}(\ln 3x)^{-3} + c$

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

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

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

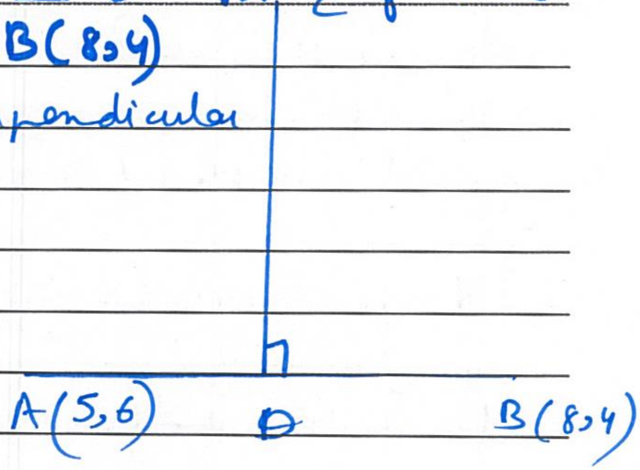
Q. No. 2 (viii) (Page 1/2)

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

Q. No. 2 (ix) (Page 1/2) Equation of $\perp$ bisector of a line joing points $A(5,6)$, $B(8,4)$

let $\overline{CD}$ be the perpendicular bisector of line AB

now since $C(a,b)$ is the mid point of AB so by mid point formula.



$$C(a,b) = C\left(\frac{5+8}{2}, \frac{6+4}{2}\right)$$

$$= C\left(\frac{13}{2}, \frac{10}{2}\right)$$

$$= C\left(\frac{13}{2}, 5\right) \rightarrow i)$$

now slope of line AB $= \frac{y_2 - y_1}{x_2 - x_1}$

$$= \frac{4-6}{8-5}$$

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

since CD is perpendicular to AB

so slope of (CD) (AB) = -1

Slope of CD $\left(\frac{-2}{3}\right) = -1$

Slope of CD $= \frac{\cancel{1}}{\cancel{2}}$

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

now since CD passes through $(\frac{13}{2}, 5)$ and has slope $3/2$ so by point slope formula.

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

$$y - 5 = \frac{3}{2}\left(x - \frac{13}{2}\right)$$

$$2y - 10 = 3\left(x - \frac{13}{2}\right)$$

$$2y - 10 = 3\left(\frac{2x - 13}{2}\right)$$

$$2y - 10 = \frac{3}{2}(2x - 13)$$

$$4y - 20 = 6x - 39.$$

$$6x - 4y - 39 + 20 = 0$$

$$6x - 4y - 19 = 0$$

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

Given lines ($2x-2y+2=0$, $3x-5y-1=0$ and $2x+Ky+8=0$ meet at a point

let $l_1 = 2x-2y+2=0$
$l_2 = 3x-5y-1=0$
$l_3 = 2x+Ky+8=0$

sinle lines meet at a point it means that they are con current so

$$\begin{vmatrix} x_1 & y_1 & c \\ x_2 & y_2 & c \\ x_3 & y_3 & c \end{vmatrix} = 0$$

so now

$$\begin{vmatrix} 2 & -2 & 2 \\ 3 & -5 & -1 \\ 2 & K & 8 \end{vmatrix} = 0$$

expaneling by R_1

$$2\begin{vmatrix} -5 & -1 \\ K & 8 \end{vmatrix} - (-2)\begin{vmatrix} 3 & -1 \\ 2 & 8 \end{vmatrix} + 2\begin{vmatrix} 3 & -5 \\ 2 & K \end{vmatrix} = 0$$

$$2(-40+K) + 2(24+2) + 2(3K+10) = 0$$

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

$8K = 8$

$\boxed{K = 1}$

so value of K is 1

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

Given inequalities are

$5x + 7y \leq 35 \rightarrow$ i) $x \geq 0$

$y \geq 0$

$-x + 3y \leq 3 \rightarrow$ ii)

Assosiated equation of i) and ii are.

$5x + 7y = 35 \rightarrow$ iii)

$-x + 3y = 3 \rightarrow$ iv

now in iii)

$5x + 7y = 35$

put $x = 0$

$7y = 35$

$y = 5$

$P_1(0, 5)$

put $y = 0$

$5x = 35$

$x = 7$

$P_2(7, 0)$

Test origin $(0,0)$ in i) : $(0) + 0 \leq 35$ $0 \leq 35$ (true) so

gr it is towards origin

now in iv

$-x + 3y \leq 3$

put $x = 0$

$3y = 3$

$y = 1$ $P_3(0, 1)$

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

$x = -3$

$P_4\ (-3, 0)$

Test origin $(0, 0)$ in ii)

$-(0) + 3(0) \leq 3$

$0 \leq 3$ true

so graph lies towards origin.

Graph is on Graph paper

(P.T.O)

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

let $x^2 + y^2 + 2gx + 2fy + c$ (→i) be the equation of circle passing through (2, 3) and (0, 2) and have centre at $3x + 2y - 3$ → a

for A(2, 3) eq i) becomes. put x = 2 and y = 3

$(2)^2 + (3)^2 + 2g(2) + 2f(3) + c = 0$

$4 + 9 + 4g + 6f + c = 0$

$4g + 6f + c = -13$ → ii)

for B(0, 2) ~~pu~~ eq i) become put x = 0 and y = 2

$(0)^2 + (2)^2 + 2g(0) + 2f(2) + c = 0$

$4 + 4f + c = 0$

$4f + c = -4$ → iii)

subtracting i) and ii)

$4g + 6f + c = -13$

$\underline{\ \ \ \ \ \ominus 4f \ominus c = \oplus 4}$

$4g + 2f = -9$ → iV

now

since centre of i) is at b put

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

$-3g - 2f - 3 = 0$

$3g + 2f + 3 = 0$

$3g + 2f = -3 \Rightarrow v)$

Subtracting iv and (v)

$4g + 2f = -9$

$-3g - 2f = +3$

$g = -6$

now

$3g + 2f = -3$

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

$2f = -3 + 18$

$f = \frac{15}{2}$

$4f + c = -4$

$\cancel{4}^2 \left(\frac{15}{\cancel{2}}\right) + c = -4 \quad = \quad 30 + c = -4$

$c = -4 - 30 = -34$

so equation of circle becomes

$x^2 + y^2 + 2gx + 2fy + c = 0$

$x^2 + y^2 + 2(-6)x + 2\cancel{f}\left(\frac{15}{2}\right) - 34 = 0$

Q. No. 2 (xiii) (Page 1/2)

focus = $(3,2)$, and directrix = $2x - y + 5 = 0$

let us consider any arbitrary point ~~on~~ $P(x,y)$ on parabola as we know

$|PF| = |PM| \rightarrow a$

$|PF| = \sqrt{(x-3)^2 + (y-2)^2} \rightarrow i)$

$|PM| = \dfrac{|2(x) - (y) + 5|}{\sqrt{(2)^2 + (-1)^2}}$

$|PM| = \dfrac{|2x - y + 5|}{\sqrt{5}} \rightarrow ii)$

now (a) becomes

$\sqrt{(x-3)^2 + (y-2)^2} = \dfrac{|2x - y + 5|}{\sqrt{5}}$

Squaring both sides

$5\left[(x-3)^2 + (y-2)^2\right] = 4x^2 + y^2 + 25 - 4xy + 20x - 10y$

$5\left[(x^2 + 9 - 6x) + (y^2 + 4 - 4x)\right] = 4x^2 + y^2 - 4xy + 20x - 10y + 25$

$5x^2 + 45 - 30x + 5y^2 + 20 - 20\cancel{x}$

Q. No. 2 (xiii) (Page 2/2)

Q. No. 2 (xiv) (Page 1/2)

Q. No. 2 (xiv) (Page 2/2)

Q. No. 2 (xv) (Page 1/2)

Given vectors

let $A = 3\hat{i} + a\hat{j} + 4\hat{k}$ and $B = 4\hat{i} + 5\hat{j} + a\hat{k}$

since vectors are perpendicular so their dot product is 0

$A \cdot B = (3\hat{i} + a\hat{j} + 4\hat{k})(4\hat{i} + 5\hat{j} + a\hat{k}) = 0$

$= 12 + 5\alpha + 4\alpha = 0$

$= 12 + 9\alpha = 0$

$= 9\alpha = -12$

$= \alpha = -\frac{12}{9}$

$\alpha = -4/3$

so $\alpha = -4/3$

Q. No. 2 (xv) (Page 2/2)

Q. No. 2 (xvi) (Page 1/2)

Given $A(-2, 1, 4)$, $B(3, 2, 5)$, $C(-3, -5, 0)$
let $D(5, 8, 9)$
volume of tetrahedron = ?

P.V of $A = \overline{OA} = -2\hat{i} + \hat{j} + 4\hat{k}$
P.V of $B = \overline{OB} = 3\hat{i} + 2\hat{j} + 5\hat{k}$
P.V of $C = \overrightarrow{OC} = -3\hat{i} - 5\hat{j} + 0\hat{k}$
P.V of $D = OD = 5\hat{i} + 8\hat{j} + 9\hat{k}$
now

$AB = \overline{OB} - \overline{OA}$
$= (3\hat{i} + 2\hat{j} + 5\hat{k}) - (-2\hat{i} + \hat{j} + 4\hat{k})$

$= (3\hat{i} + 2\hat{j} + 5\hat{k}) + 2\hat{i} - \hat{j} - 4\hat{k}$

$= (5\hat{i} + \hat{j} + \hat{k})$

$AC = \overline{OC} - \overline{OA}$
$= -3\hat{i} - 5\hat{j} + 0\hat{k} - (-2\hat{i} + \hat{j} + 4\hat{k})$

$= -3\hat{i} - 5\hat{j} + 0\hat{k} + 2\hat{i} - \hat{j} - 4\hat{k}$

$= -\hat{i} - 6\hat{j} - 4\hat{k}$

$AD = \overline{OD} - \overline{OA}$
$\cancel{3\hat{i}}\ 5\hat{i} + 8\hat{j} + 9\hat{k} - (-2\hat{i} + \hat{j} + 4\hat{k})$

$= 5\hat{i} + 8\hat{j} + 9\hat{k} + 2\hat{i} - \hat{j} - 4\hat{k}$

Q. No. 2 (xvi) (Page 2/2)

volme of tetrahedron $= \frac{1}{6} | A.B. (AC \times AD) |$

$$= \frac{1}{6} \begin{vmatrix} 5 & 1 & 1 \\ -1 & -6 & -4 \\ 7 & 7 & 5 \end{vmatrix}$$

Expanding by R_1

$$= \frac{1}{6} \left(5| -30+28| -1| -5+28| +1| -7+42| \right)$$

$$= \frac{1}{6} \left(-10 -1(23) +1(35) \right)$$

$$= \frac{1}{6} \left(-10 - 23 + 35 \right)$$

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

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

$$f(x) = \begin{cases} mx+3 & \text{if } x<3 \\ m+n & \text{if } x=3 \\ -x+9 & \text{if } x>3 \end{cases}$$

(a)

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

Left hand limit

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

Applying the limit.

$= 3m+3$

$\lim_{x\to 3^+} f(x)$

Right hand limit.

$\lim_{x\to 3^+} f(x) = \lim_{x\to 3} -x+9$

Applying the limit

$= -3+9$

$= +6$

(b)

$f(3)$

$f(3) = m+n)$

Q. No. 3 (Page 2/4) (c)

Since $f(x)$ is continuous at $x = 3$

so

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

$\lim_{x \to 3^+} f(x) = f(3) \rightarrow$ i)

$\lim_{x \to 3^+} f(x) = \lim_{x \to 3^-} f(x) \rightarrow$ ii)

from i)

$6 = m + n \rightarrow$ a)

from ii)

$3m + 3 = 6$

$3m = 6 - 3$

$3m = 3$

$\boxed{m = 1}$

put $m = 1$ in a

$6 = m + n$

$6 = 1 + n$

$6 - 1 = n$

Q. No. 3 (Page 3/4)

$$f(x) = \begin{cases} x+3 & \text{if } x < 3 \\ 6 & \text{if } x = 3 \\ -x+9 & \text{if } x > 3 \end{cases}$$

now

for $y = f(x) = x+3$ if $x < 3$.

x	-1	0	1	2	-2
$y = x+3$	2	3	4	5	1

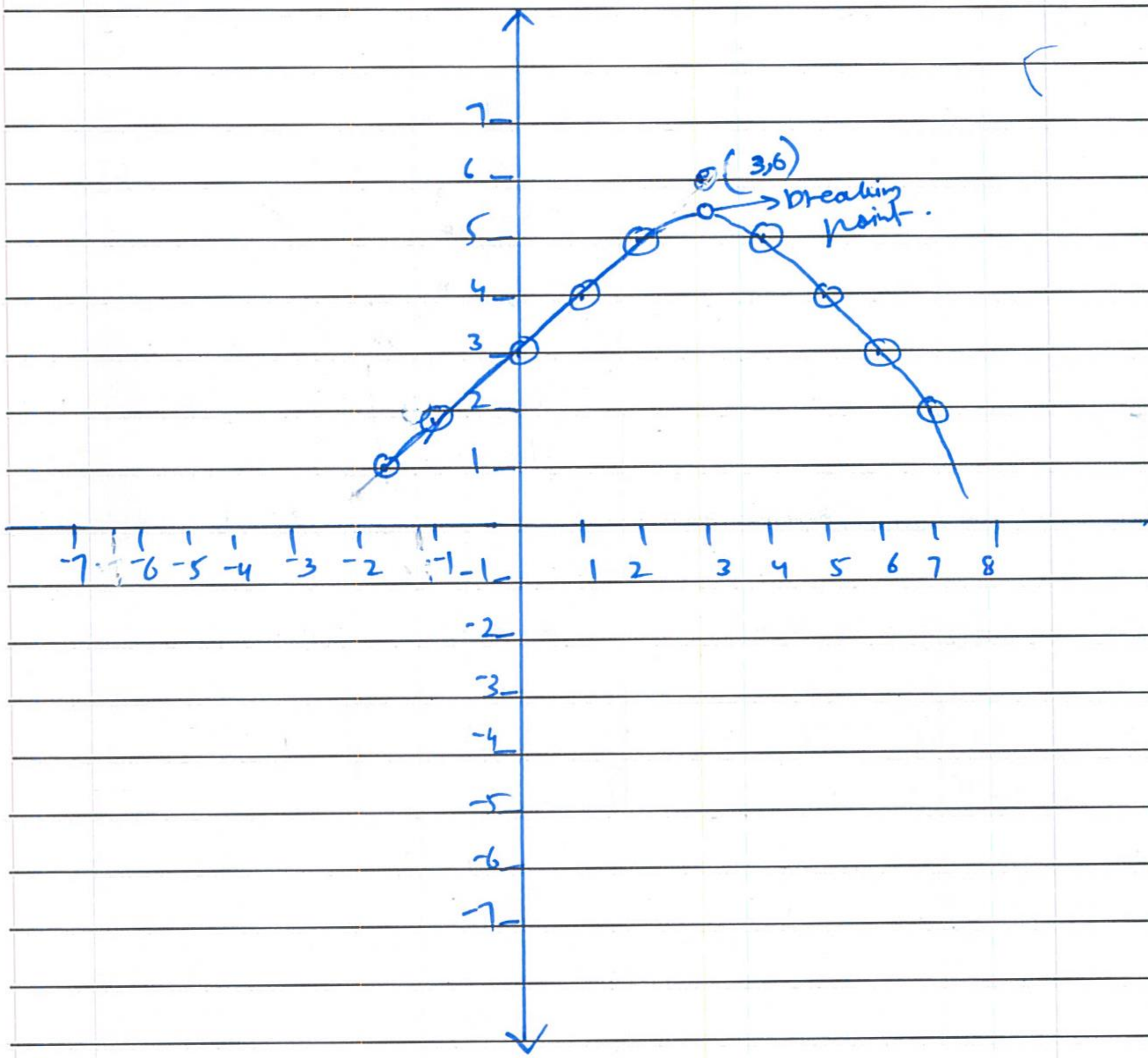
for $y = f(x) = -x+9$ $x > 3$

x	4	5	6	7
$y = -x+9$	5	4	3	2

and 6 at $x = 3$.

(Graph on next page)

Q. No. 3 (Page 4/4)



Q. No. 4 (Page 1/4)

Given perimeter of triangle = 18 cm.
also one side is 8cm. let x and y be other two sides now

$x + y + \cancel{18} = 18cm.$

$x + y = 18 - 8$

$x + y = 10$ cm.

$\boxed{y = 10 - x}$

now Area of $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$

let $f(x) = A^2 = \left(\sqrt{s(s-a)(s-b)(s-c)}\right)^2$

$A = s(s-a)(s-b)(s-c)$

here $s = \frac{a+b+c}{2} = \frac{18}{2} = 9$

$A = 9(9-8)(9-x)(9-y)$

$= 9(1)(9-x)(9-(10-x)$

$= 9(9-x)(9-10+x)$

$= 9(9-x)(x-1)$

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

$= 9(10x - x^2 - 9)$

$f(x) = A = 90x - 9x^2 - 81 \rightarrow i)$

$(9-x)(-1+x)$

$-9 + 9x + x - x^2$

$10x - 9 - x^2.$

$90x - 81 - 9x^2.$

Q. No. 4 (Page 2/4)

put $f'(x) = 0$

$-18x + 90 = 0$

$90 = 18x$

$5 = x$

now

$f''(x) = -18 \rightarrow ii)$

put $x = 5$ in ii)

$f''(5) = -18 < 0$ so area will be maximum.

now

here

$x = 5$

and

$y = 10 - x$

$y = 10 - 5$

$\boxed{y = 5}$

so other sides are 5, 5

Q. No. 4 (Page 3/4)

Q. No. 4 (Page 4/4)

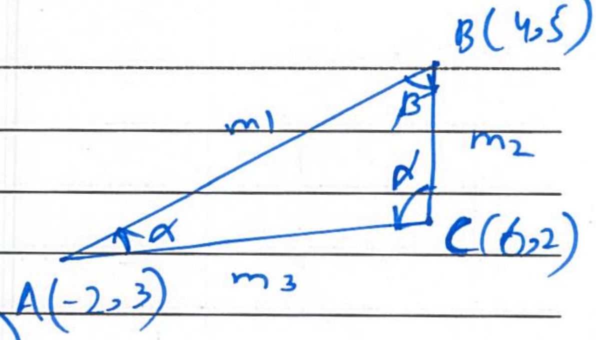
Q. No. 5 (Page 1/4)

Q. No. 5 (Page 2/4)

Q. No. 5 (Page 3/4)

Q. No. 5 (Page 4/4)

Q. No. 6 (Page 1/4)



(a) Slope of

~~AB=~~

A(-2,3), B(4,5), C(6,2)

now

slope of $\overline{AB} = \frac{y_2 - y_1}{x_2 - x_1} =$

$m_1 = \frac{5-3}{4-(-2)} = \frac{2}{6} = \frac{1}{3}$

Slope of $\overline{AC} = \frac{2-3}{6+2} = \frac{-1}{8} = m_3$

slope of $\overline{BC} : \frac{2-5}{6-4} = \frac{-3}{2} = m_2$

(b) angle between AB and BC.

let β be angle between AB and BC

$\tan\beta = \frac{m_2 - m_1}{1 + m_1 m_2}$

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

Q. No. 6 (Page 2/4)

$$= \frac{\frac{-9-2}{\cancel{6}}}{\frac{6-3}{\cancel{6}}}$$

$$\tan\beta = \frac{-\cancel{11}}{3} = -\frac{11}{3}$$

$$-\tan\beta = \frac{11}{3}$$

$$\tan(180-\beta) = \frac{11}{3}$$

$$180-\beta = \tan^{-1}\frac{11}{3}$$

$$180-B = 74.744$$

$$180-74.744 = B$$

$$\beta = 105.255$$

angle between AB and AC

let α be the angle between AB and AC.

$$\tan\alpha = \frac{m_1-m_2}{1+(m_1)(m_2)}$$

Q. No. 6 (Page 3/4)

$$\tan\alpha = \frac{\frac{1}{3}+\frac{1}{8}}{1+\frac{-1}{24}}$$

$$= \frac{\frac{8+3}{\cancel{24}}}{\frac{24-1}{\cancel{24}}}$$

$$\tan\alpha = \frac{11}{23}$$

$$\alpha = \tan^{-1}\frac{11}{23}$$

$$\alpha = 25.559$$

(C)

equation of sides AB

$A(-2,3)$, $B(4,5)$

now by two point form.

$$\frac{\cancel{y-y_1}}{y_2-y_1} = \frac{x-x_1}{x_2-x_1}$$

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

$$\frac{y-3}{2} = \frac{x+2}{6}$$

Q. No. 6 (Page 4/4) $3(y-3) = x+2$

$3y-9 = x+2$

$x-3y+2+9 = x-3y+11$

BC equation of side

B(4,5), C(6,2)

BC equation by two point from

$\cancel{\frac{x-5}{6}}$ $\frac{x-4}{6-4} = \frac{y-5}{2-5}$

$= \frac{x-4}{2} = \frac{y-5}{-3}$

$-3(x-4) = 2(y-5)$

$-3x+12 = 2y-10$

$= 2y+3x-10-12$

$2y+3x-22=0$

d) now to check points are collinear

for collinear $\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} = 0$

$\begin{vmatrix} -2 & 3 & 1 \\ 4 & 5 & 1 \\ 6 & 2 & 1 \end{vmatrix}$ expanding by R_1

$= -2(5-2) -3|4-6| + 1|8-30|$

Q. No. 7 (Page 1/4) Uet x be the number of chairs and y be the number of tables.

now -

$x+y \le 28$

cost of 1 chair = 480

cs of x chair 480x

cost of 1 table = 300

cost of x table = 300x.

now

$480x + 300y \le 12000$

let f(x) be the profit function

$f(x) = 200x + 150y \rightarrow a)$

now

subject to constrains.

$x+y \le 28 \rightarrow i)$

$480x + 300y \le 12000$

$48x + 30y \le 1200$

$16x + 10y \le 400$

$8x + 5y \le 200 \rightarrow ii)$

now

assosiated eq of i) and ii is.

$x + y = 28 \rightarrow iii)$

$8x + 5y = 200$ iv)

Q. No. 7 (Page 2/4) put $x = 0$

$y = 28$ $P_1(0, 28)$

put $y = 0$

$x = 28$ $P_2(28, 0)$

for $8x + 5y = 200$

put $x = 0$

$5y = 200$

$y = 40$ $P_3(0, 40)$

~~for~~ put $y = 0$

$8x = 60$

$x = \frac{25}{4}$ $(\frac{25}{4}, 0)$

now

$8x + 5y \leq 200$

~~put~~ test origin $(0, 0)$

$8(0) + 5(0) \leq 60$

$0 \leq 60$ true (towards origin)

$x + y \leq 28$

test origin $(0, 0)$

$0 + 0 \leq 28$

$0 \leq 28$ (true) towards origin

Graph P/T/O on Graph ~~Page~~/Page

Graph no2

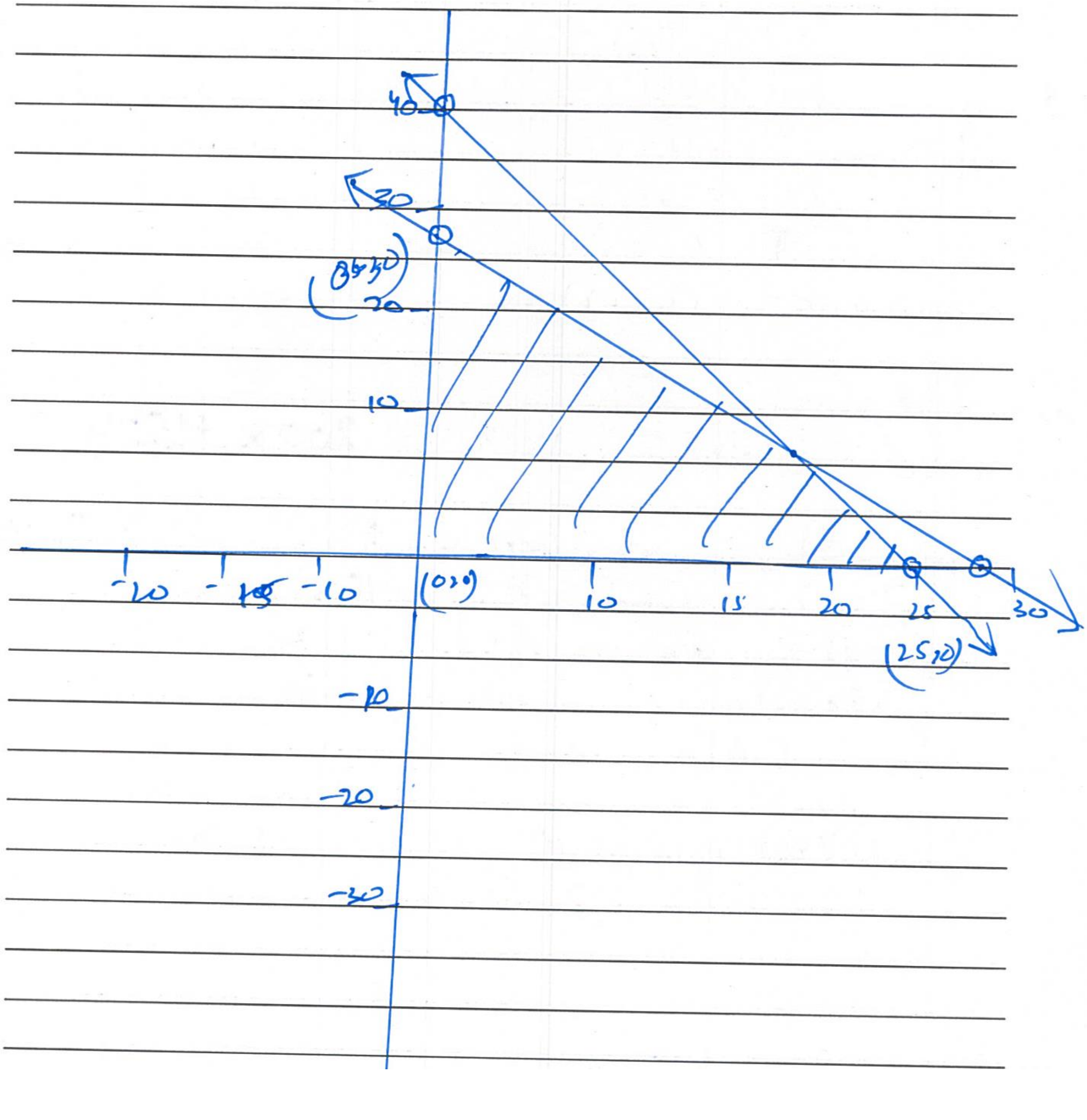
Q. No. 7 (Page 3/4)

now corner points are

$(0,0)$, $(0,12)$, $\left(\frac{15}{2}, 0\right)$

f(

corner points / $f(x) = 200x + 150y$



Q. No. 7 (Page 4/4)

corner point

$x + y = 28$

$8x + 5y = 200$

$8x + 5y = 200$
$\underline{5x + 5y = 140}$
$3x = 60$
$x = 20$

$y = 28 - 20$
$y = 8$

corner point $(20, 8)$

~~f(x~~

corner point	$f(x) = 200x + 150y$
$(20, 8)$	$200(20) + 150(8) = \cancel{4000}$ 5200
$(0, 0)$	$200(0) + 15(0) = 0$
$(25, 0)$	$200(25) + 15(0) = 5000$
$(0, 30)$	$200(0) + 150(30) = 4500$

so maximum profit will be attained if he used 20 chairs and 8 tables.

Q. No. 8 (Page 1/4)

$$25x^2 + 4y^2 - 250x - 16y + 541 = 0$$

$$(25x^2 - 250x + 25) + (4y^2 - 16y + 4) = -541 + 25 + 4$$

$$(5x - 5)^2 + (2y - 2)^2 = -512$$

$$5^2(x-5)^2 + 2(y-2)^2 = -512 .$$

$$\cancel{\frac{(x-5)^2}{\frac{-512}{25}} + (y-2)^2 + (y-2)^2}$$

$$= 8 \quad \frac{(x-5)^2}{\frac{-512}{25}} + \frac{(y-2)^2}{\frac{-512}{2}} = 1$$

Q. No. 8 (Page 2/4)

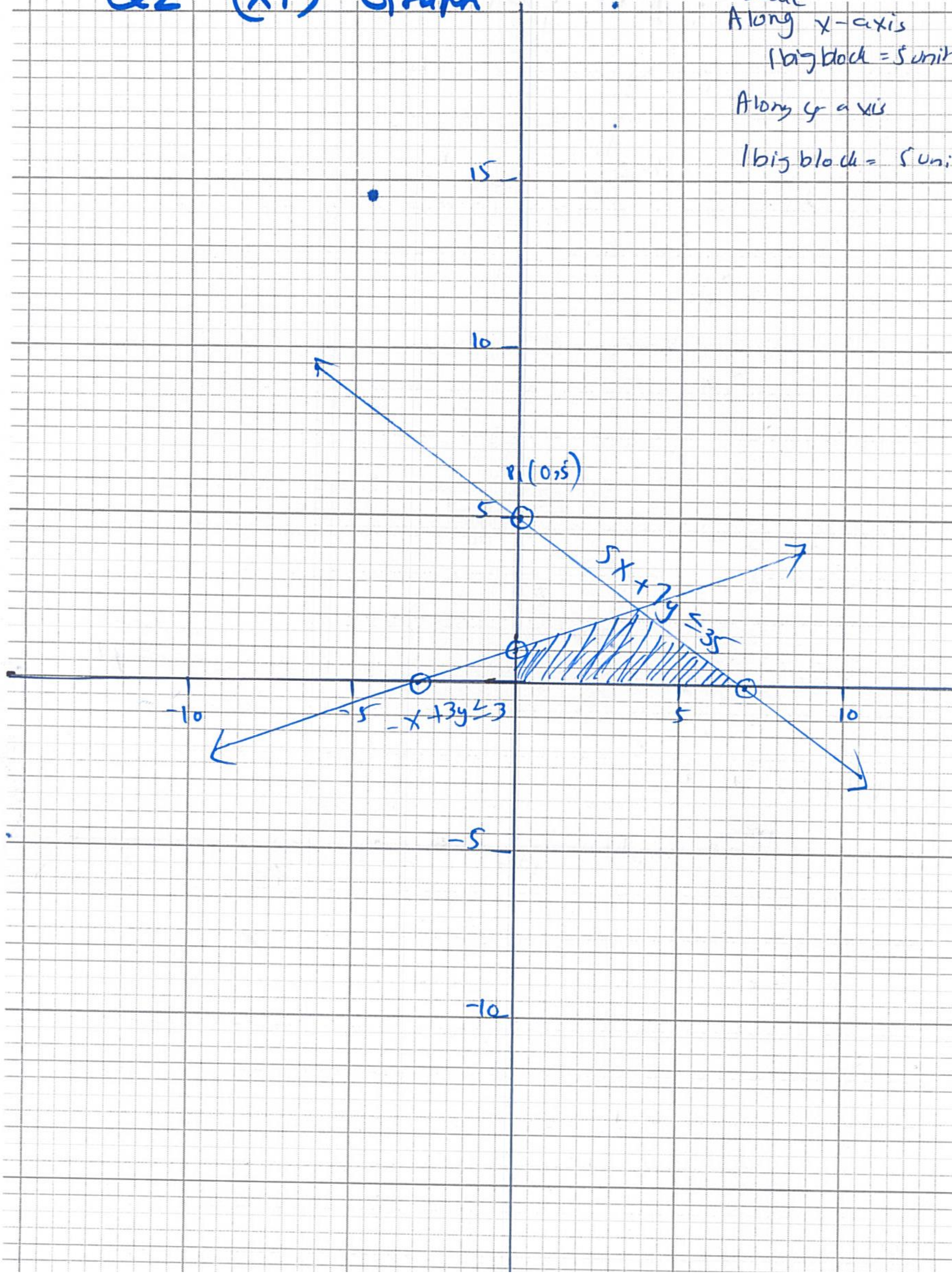
Q. No. 8 (Page 3/4)

Q. No. 8 (Page 4/4)

Q2 (xi) Graph

Scale
Along x-axis
1 big block = 5 units

Along y axis
1 big block = 5 units.



Graph Page No. 2

Q7 Graph P.T.O