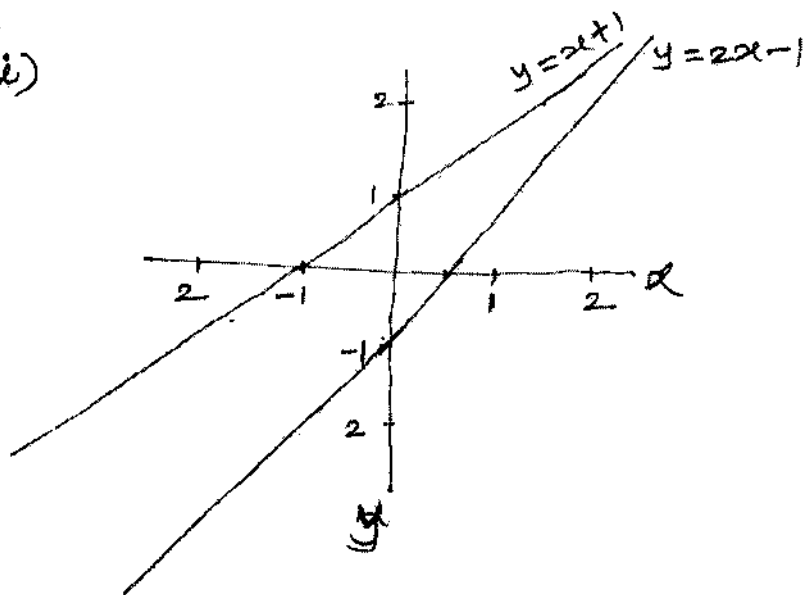


①

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①

Q.1.
a) i)

ii) limits

$$1) \frac{1}{3} \quad 2) 2 \quad 3) 1 \quad 4) -\frac{1}{3}$$

b) i) $D = S$

$$\therefore 300 - 4P = 50 + P$$

$$\therefore 350 = 5P$$

$$\therefore \boxed{P = 70}$$

$$D = 300 - 4(70)$$

$$= 300 - 280$$

$$\boxed{D = 20}$$

ii)

$$\lim_{x \rightarrow 4} \frac{x^2 - 16}{x^2 - 4}$$

$$= \lim_{x \rightarrow 4} \frac{(x+4)(x-4)}{(x-4)}$$

$$= 4 + 4$$

$$= 8$$

$$\therefore f(4) = 8$$

$\therefore f(x)$ is continuous at $x = 4$.

$$c) \quad 1) \frac{3x^2}{5(x^3)^{\frac{2}{5}}} \quad 2) \frac{6}{x^4} \quad 3) 8x$$

$$4) 12x^2 + 20x + 4$$

$$5) \frac{9x^2 + 12x + 12}{(3x+2)^2}$$

$$6) 16x^3 - 12x^2 + 12x$$

②

2

2

Q.2 a)

$$\pi = TR - TC$$

$$= 300Q - 4Q^2 - 50Q + 100$$

$$= 250Q - 4Q^2 + 100$$

$$\pi \text{ is Max. at } \frac{\partial \pi}{\partial Q} = 0$$

$$\therefore \frac{\partial \pi}{\partial Q} = 250 - 8Q$$

$$\therefore 250 - 8Q = 0$$

$$\therefore Q = \frac{250}{8} = 31.25$$

$$\pi = 250(31.25) - 4(31.25)^2 + 100$$

$$= 7812.5 - 3906.25 + 100$$

$$= 4006.25$$

b) Second order derivatives.

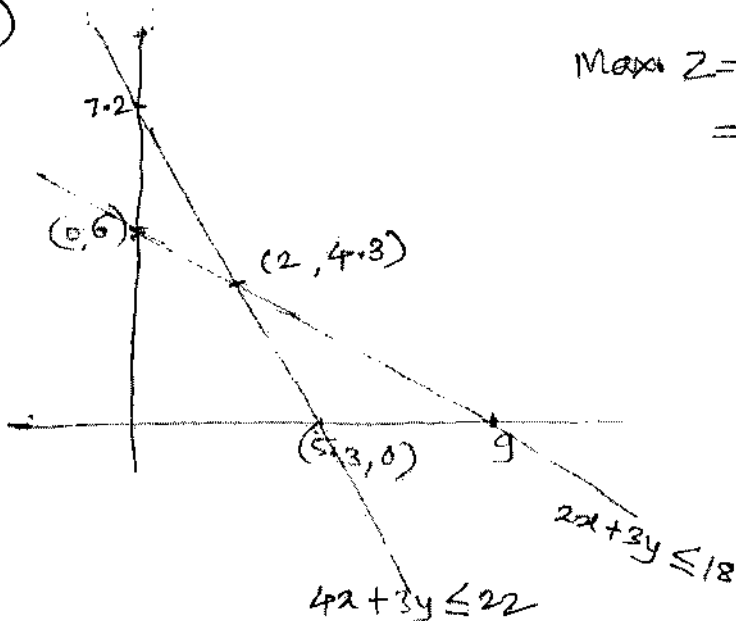
i) $132x^2 - 42x + 12$

ii) $\frac{18}{x^4}$

iii) $12x - 2$

iv) $6x + 2$

c)



$$\text{Max } Z = 5(0) + 7(6) \\ = 42$$

3

3

Q.3 a) i) $AB = \begin{bmatrix} 5 & 3 \\ 7 & 2 \end{bmatrix}$ $BA = \begin{bmatrix} 8 & 1 \\ 3 & -1 \end{bmatrix}$ $AB \neq BA$

ii) $CA = \begin{bmatrix} 9 & 8 \\ 1 & -4 \end{bmatrix}$ $\therefore BA \neq CA$

b) i)

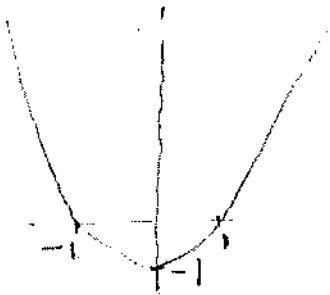
$$3A + 2B = \begin{bmatrix} 12 & 3 & 1 \\ 2 & 2 & 17 \end{bmatrix}$$

2) $4A - 3B = \begin{bmatrix} -1 & 4 & -10 \\ -3 & 14 & 17 \end{bmatrix}$

c) i) $t_{25} = 155$ & $t_{34} = 200$

ii) $t_7 = 2187$, & $t_9 = 19683$

Q.4. a)
i)



ii) $\pi = TR - TC$

$$\frac{\partial \pi}{\partial Q} = \frac{\partial TR}{\partial Q} - \frac{\partial TC}{\partial Q}$$

at maximum π $\frac{\partial \pi}{\partial Q} = 0$

$$\frac{\partial TR}{\partial Q} - \frac{\partial TC}{\partial Q} = 0$$

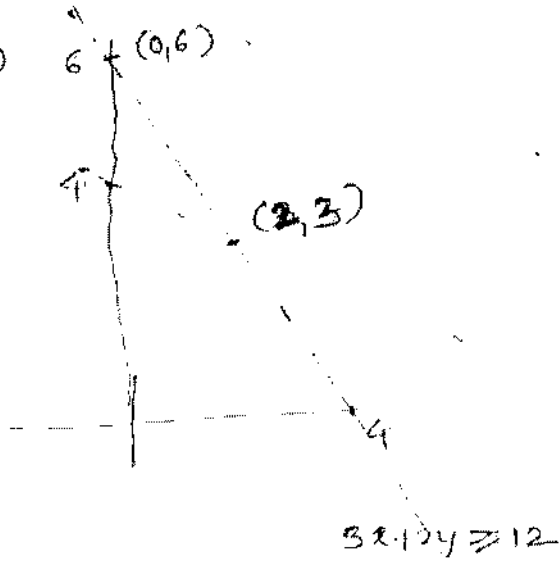
$$\therefore \frac{\partial TR}{\partial Q} = \frac{\partial TC}{\partial Q}$$

$$MR = MC$$

(y)

(x)

4 b)



$$\begin{aligned} \text{Mini. } Z &= 3x + 4y \\ &= 3(2) + 4(3) \\ &= 18 \end{aligned}$$

(8, 0)

$$x + 2y \geq 8$$

$$c) \text{ ii) } S_{100} = 14950$$