

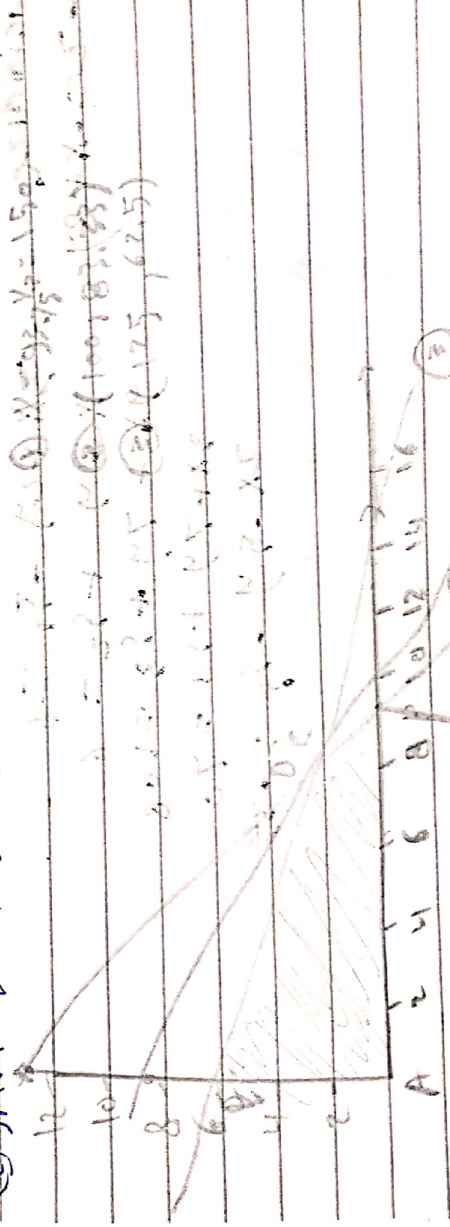
II

$$\begin{aligned} 16x_1 + 10x_2 &= 1500 & x_1 &= 1500 \\ 10x_1 + 12x_2 &= 1000 & x_2 &= 710 \end{aligned}$$

① Modeling

$$\begin{aligned} \max Z &= 10x_1 + 15x_2 \\ s.t. & 16x_1 + 10x_2 \leq 1500 \\ & 10x_1 + 12x_2 \leq 1000 \\ & x_1 \geq 0, x_2 \geq 0 \end{aligned}$$

② Graphical Representation



$$\textcircled{1} \textcircled{2} \Rightarrow x_2 = 10.87, x_1 = 82.83$$

$$\begin{aligned} 310 \\ 310 \end{aligned}$$

$$\textcircled{2} Z_1 = 10 \times 82.83 + 15 \times 10.87 = 935$$

Then get MAX Z

Q2 @ simplex method

$$z = x - 8y$$

$$s.t. \quad x - 2y \leq -6$$

$$x - y \leq 6$$

$$9x + 7y \leq 108$$

$$x \geq 0$$

$$3x + 7y \leq 70$$

$$y \geq 0$$

$$-2x + 5y \leq 35$$

minimize

$$3x + 2y - s_1 = 6$$

$$-z = -x + 8y$$

$$x - y + s_2 = 6$$

$$9x + 7y + s_3 = 108$$

$$3x + 7y + s_4 = 70$$

$$2x - 5y - s_5 = -35$$

	x	y	s ₁	s ₂	s ₃	s ₄	s ₅	RHS
s ₁	3	2	-1	0	0	0	0	6
s ₂	1	-1	0	1	0	0	0	6
s ₃	9	7	0	0	1	0	0	108
s ₄	3	7	0	0	0	1	0	70
s ₅	2	-5	0	0	0	0	1	-35
z	-1	8	0	0	0	0	0	0

2) Graphical Representation:

$$\text{Max } F = X - 8Y$$

$$\text{s.t. } 2X + 2Y \leq 6 \quad (1)$$

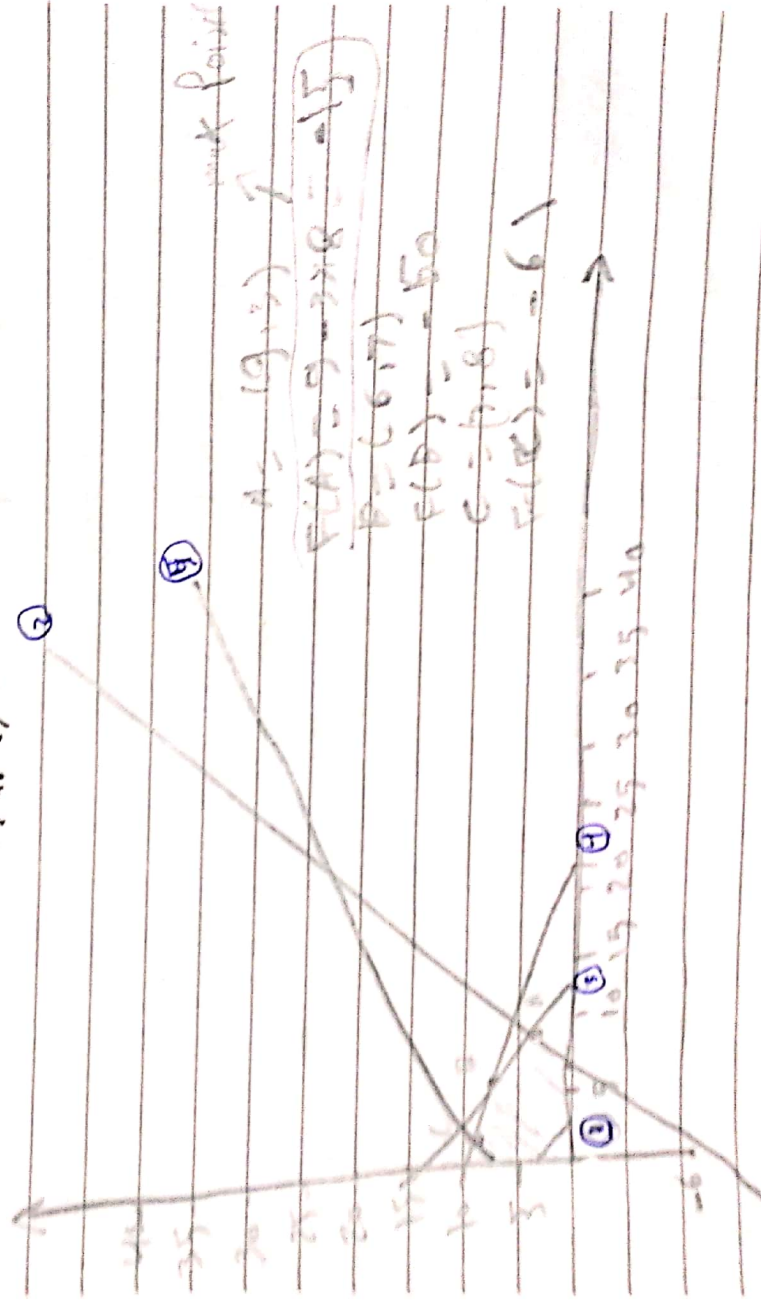
$$X - Y \leq 6 \quad (2)$$

$$7X + 7Y \leq 108 \quad (3)$$

$$3X + 7Y \leq 70 \quad (4)$$

$$2X - 5Y \leq 35 \quad (5)$$

$$71X \leq 710$$



4. a) using simplex method

$$\text{Min } F = 2x_1 + 4x_2$$

$$\text{s.t. } x_1 + x_2 \leq 6$$

$$6x_1 + 4x_2 \geq 12$$

$$x_1 + 4x_2 = 20$$

$$x_1 \geq 0$$

$$x_2 \geq 0$$

$$x_1 + x_2 + s_1 = 6$$

$$6x_1 + 4x_2 + s_2 = 12$$

$$x_1 + 4x_2 + s_3 = 20$$

	x_1	x_2	s_1	s_2	s_3	Solution
s_1	(1)	1	1	0	0	6
s_2	6	(4)	0	-1	0	12
s_3	1	4	0	0	1	20
Z	-2	-4	0	0	0	0

b) Graphical method

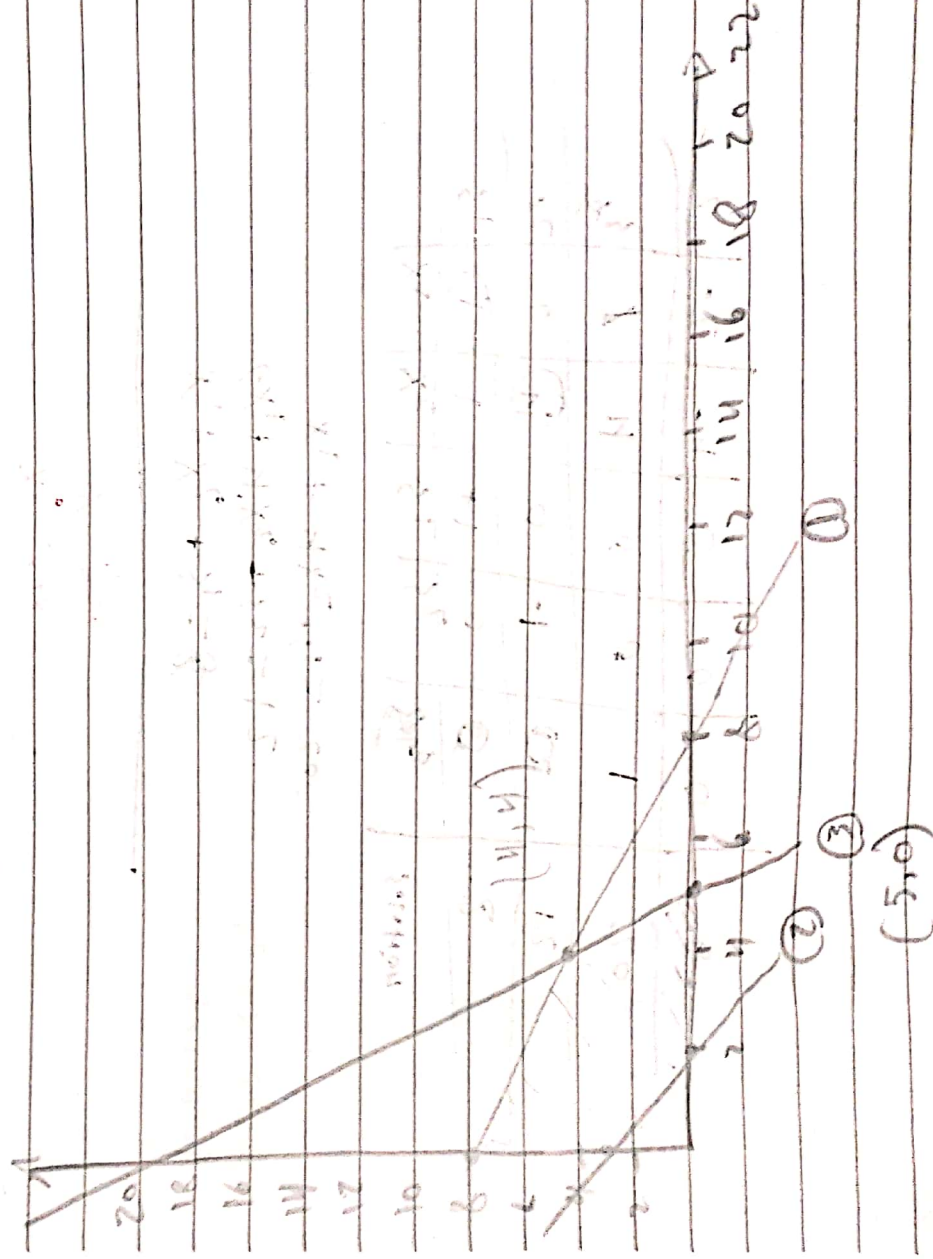
$$\text{Min } F = 2x_1 + 4x_2$$

$$\text{s.t. } x_1 + x_2 \leq 8$$

$$6x_1 + 4x_2 \geq 12$$

$$x_1 + 4x_2 = 20$$

$$x_1 \geq 0, x_2 \geq 0$$



$F = 10$ at point $(5, 0)$ \rightarrow in maximization

$(4, 4)$

$F = 8$ at point $(4, 4)$ \rightarrow in minimization

① in case of Max, we take Max FCR

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(5) $\max F = 3x_1 + 2x_2$

s.t $4x_1 - x_2 \leq 8$ $x_1, x_2 \geq 0$

$4x_1 + 3x_2 \leq 12$

$4x_1 + x_2 \leq 8$

(a) Simplex method

$4x_1 - x_2 + s_1 = 8$

$4x_1 + 3x_2 + s_2 = 12$

$4x_1 + x_2 + s_3 = 8$

x_1	x_2	s_1	s_2	s_3	Solution
s_1 (4)	-1	1	0	0	8
s_2 (4)	(3)	0	1	0	12
s_3 (4)	1	0	0	1	8
F	-3	-2	0	0	0

4	-1	1	0	0	8
0	4	-1	1	0	4
0	2	-1	0	1	0
0	-5/4	3/4	0	0	6

⑥ graphical method

$$\max F = 3x_1 + 2x_2$$

$$\text{s.t. } 4x_1 - x_2 \leq 8 \quad x_1, x_2 \geq 0$$

$$4x_1 + 3x_2 \leq 12$$

$$4x_1 + x_2 \leq 8$$

