

Subject

Assignment 2,
well Engg

Date 29/3/21

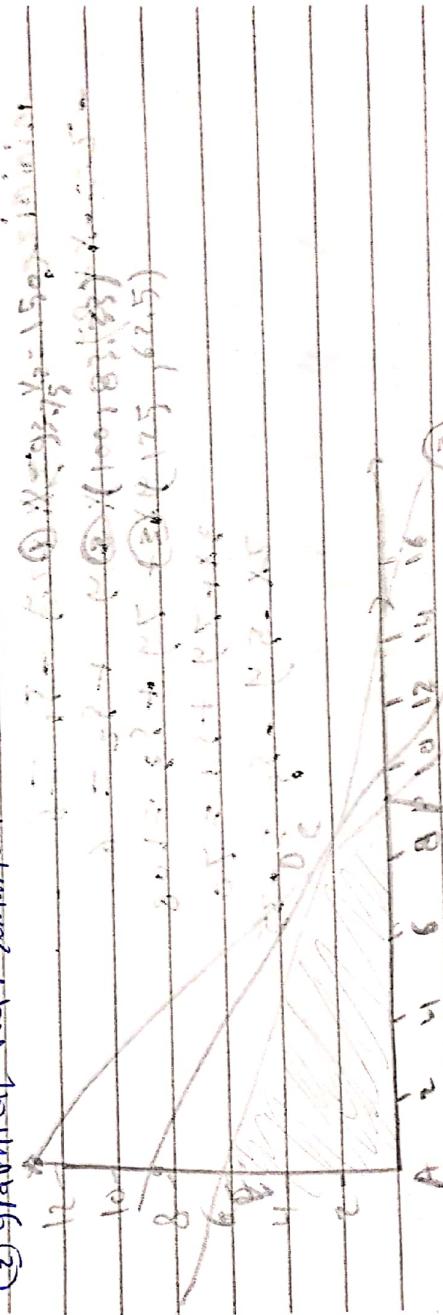
II

$$\begin{aligned} \text{S.t.} \quad & 6x_1 + 10x_2 + 4x_3 = 1500 \quad X_1 \leq 71.9 \\ & 10x_1 + 12x_2 + 8x_3 = 1000 \quad X_2 \leq 71.9 \end{aligned}$$

① Modeling

$$\begin{aligned} \text{min } Z &= 10x_1 + 15x_2 \\ \text{s.t.} \quad & 6x_1 + 10x_2 \leq 1500 \quad X_1 \leq 71.9 \\ & 10x_1 + 12x_2 \leq 1000 \quad X_2 \leq 71.9 \\ & x_1, x_2 \geq 0 \end{aligned}$$

② graphical Representation



$$\textcircled{1} \quad 6x_1 + 10x_2 = 1500 \quad X_1 = 71.9$$

$$\textcircled{2} \quad 10x_1 + 12x_2 = 1000 \quad X_2 = 71.9$$

$$\textcircled{3} \quad Z = 10x_1 + 15x_2 \quad 10 \cdot 71.9 + 15 \cdot 71.9 = 991.35$$

Then get Max Z

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Q) simplex method

$$\begin{aligned} \text{minimize } & 3x + 2y \\ \text{subject to } & x + y \leq 6 \\ & 2x + 5y \leq 35 \\ & x \geq 0, y \geq 0 \end{aligned}$$

$$\begin{aligned} \text{minimize } & 3x + 2y \\ \text{subject to } & x + y + s_1 = 6 \\ & 2x + 5y + s_2 = 35 \\ & x \geq 0, y \geq 0 \end{aligned}$$

$$\begin{aligned} \text{minimize } & 3x + 2y - z_1 = 6 \\ \text{subject to } & x + y + s_1 = 6 \\ & 2x + 5y + s_2 = 35 \\ & x \geq 0, y \geq 0, z_1 \geq 0 \end{aligned}$$

$$\begin{aligned} \text{minimize } & 3x + 2y - z_1 = 6 \\ \text{subject to } & x + y + s_1 = 6 \\ & 9x + 7y + s_3 = 108 \\ & 3x + 7y + s_4 = 70 \\ & 2x + 5y \leq 35 \\ & x \geq 0, y \geq 0, z_1 \geq 0 \end{aligned}$$

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

2) Graphical representation:

$$\text{Max } F = X - QY$$

① 9424284-4

$$X - \bar{v} \leq 6$$

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$$3x + 1 = 70$$

二十九

2



Point $(-19, 2)$

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100

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٤٠ ② using simplex method

$$\begin{aligned} \text{Min } F &= 2x_1 + 4x_2 \\ \text{s.t. } x_1 + x_2 &\leq 6 \\ 6x_1 + 4x_2 &\geq 20 \\ x_1 + x_2 &= 20 \\ x_1 &\geq 0 \\ x_2 &\geq 0 \end{aligned}$$

$$\begin{aligned} x_1 + x_2 + s_1 &= 20 \\ 6x_1 + 4x_2 + s_2 &= 20 \\ x_1 + 4x_2 + s_3 &= 20 \end{aligned}$$

	x_1	x_2	s_1	s_2	s_3	F
s_1	1	1	0	0	0	0
s_2	6	4	0	-1	0	0
s_3	1	4	0	0	1	0
	2	-2	-4	0	0	0

solution

الخطوة الأولى

الخطوة الثانية

الخطوة الثالثة

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② Graphical Method

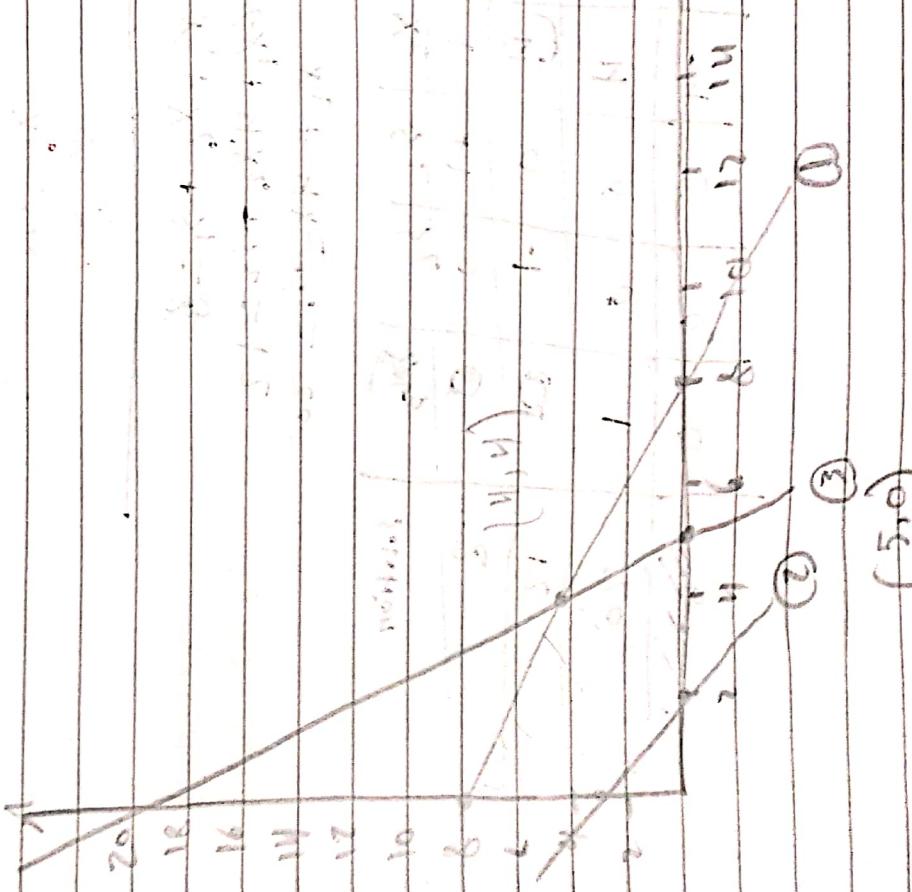
$$\text{Min } F = 2x_1 + 4x_2$$

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

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

$$x_1 + 4x_2 = 20$$

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



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

$$(5,0)$$

$F = 8$ at point $(4,1)$ \rightarrow minimization

③ in case of Max, we take Max $F(x)$

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$$(5) \text{ Max } F = -3x_1 + 2x_2$$

$$\text{s.t. } 4x_1 + x_2 \leq 8$$

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

$$4x_1 + x_2 \leq 8$$

② 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
4	-1	1	0	0		+ $\frac{3}{4}$
4	3	0	0	0		8
4	1	0	0	1		12
						8
-3	-2	0	0	0		

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

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(b) Graphical method

$$\begin{aligned} \text{Maximize } & F = 3x_1 + 2x_2 \\ \text{subject to } & 4x_1 + 6x_2 \leq 12 \\ & 4x_1 + 3x_2 \leq 12 \\ & 4x_1 + x_2 \leq 8 \end{aligned}$$

(Zero) corner point

(1) corner point

(2) corner point

(3) corner point

(4) corner point

Max point

