Linear Programming

Question 1

Solve the given linear programming problems graphically:

Maximize: Z = 8x + y

and the constraints are (subject to) :

x + y ≤ 40,

2x + y ≤ 60,

x ≥ 0, y ≥ 0

steps for solving Linear programming questions:

1) Plot each constraint.

2) Find the Feasible Region.

3) Find the corner points of the feasible region.

4) Calculate the objective function (Maximize/Minimize).

5) Find the optimal solution according to the objecting function.

Maximize $Z = 8X + y$

Subject to

$$X + y \leq 40$$
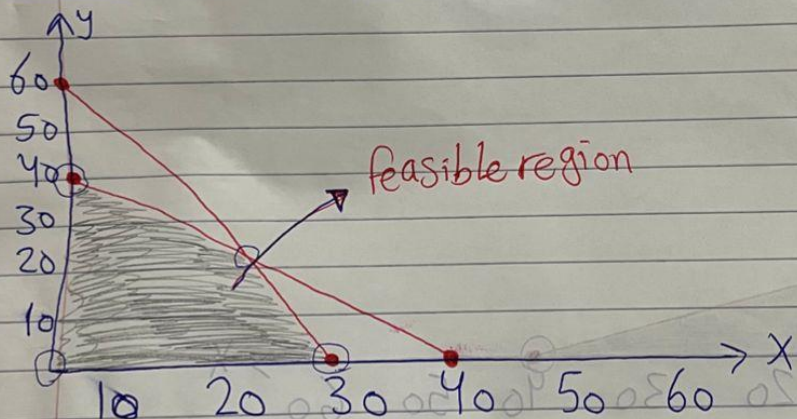$$2X + y \leq 60$$
$$x, y \geq 0$$

Solution

① Plot each Constraint

$X + y = 40$

X	0	40
y	40	0

$2X + y = 60$

X	0	30
y	60	0

feasible region

(x, y)

Corner Points	Obj fn $Z = 8X + y$
(0,0)	
(30,0)	240
(0,40)	40
(20,20)	180

The maximum value $Z = 240$ at $X = 30$, $y = 0$

$X + y = 40$
$2X + y = 60$
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$X = 20$, $y = 20$

Question 2

Solve the given linear programming problems graphically:

Minimize: Z = 20x + 10y

and the constraints are :

x + 2y ≤ 40,

3x + y ≥ 30,

4x + 3y ≥ 60,

x ≥ 0, y ≥ 0

objective function $Z = 20x + 10y$
(minimize)

Subject to
$$x + 2y \leq 40$$
$$3x + y \geq 30$$
$$4x + 3y \geq 60$$
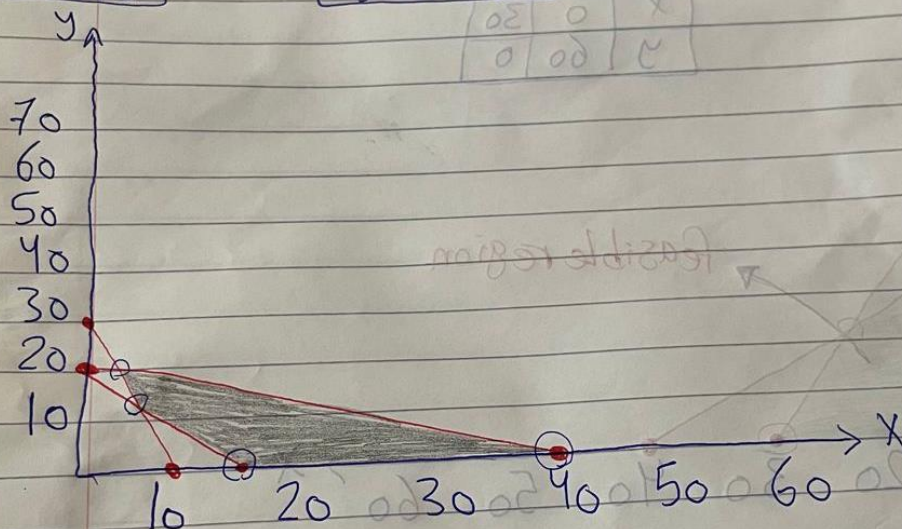$$x, y \geq 0$$

Solution

$x + 2y = 40$

x	0	40
y	20	0

$3x + y = 30$

x	0	10
y	30	0

$4x + 3y = 60$

x	0	15
y	20	0

(x, y)	$Z = 20x + 10y$
(15, 0)	300
(40, 0)	800
(6, 12)	240
(4, 18)	260

The minimum value is 240 at x = 6, y = 12

$4x + 3y = 60$
$3x + y = 30$
_____
$x = 6$
$y = 12$

$x + 2y = 40$
$3x + y = 30$
_____
$x = 4$
$y = 18$