MP-1 TUTORIAL-1

1. **Demonstrate the Graphical method**

QUESTION:
Minimize 4p + 5q + 6r
Subject to:
      p + q >= 11
      p - q <= 5
      r - p - q = 0
      7p >= 35 – 12q
      p >= 0 q >= 0 r >= 0

Minimize z =
$$4p + 5q + 6r$$
subject to
$$p + q >= 11$$
$$p - q \leq 5$$
$$r - p - q = 0 \implies r = p + q$$
$$7p \geq 35 - 12q$$

Minimize $z = 4p + 5q + 6(p+q)$
$$z = 10p + 11q$$
subject to
$$p + q \geq 11$$
$$p - q \leq 5$$
$$7p + 12q \geq 35$$

$p + q \geq 11$ $p - q \leq 5$ $7p + 12q \geq 35$
Treat as $p + q = 11$ Treat as $p - q = 5$ Treat as $7p + 12q = 35$

P	0	11
q	u	0

P	0	5
q	-5	0

P	0	5
q	2.92	0

corner point	value of z
(0, 11)	121
(8, 3)	113

The minimum value of z is 113 at extreme point (8,3)
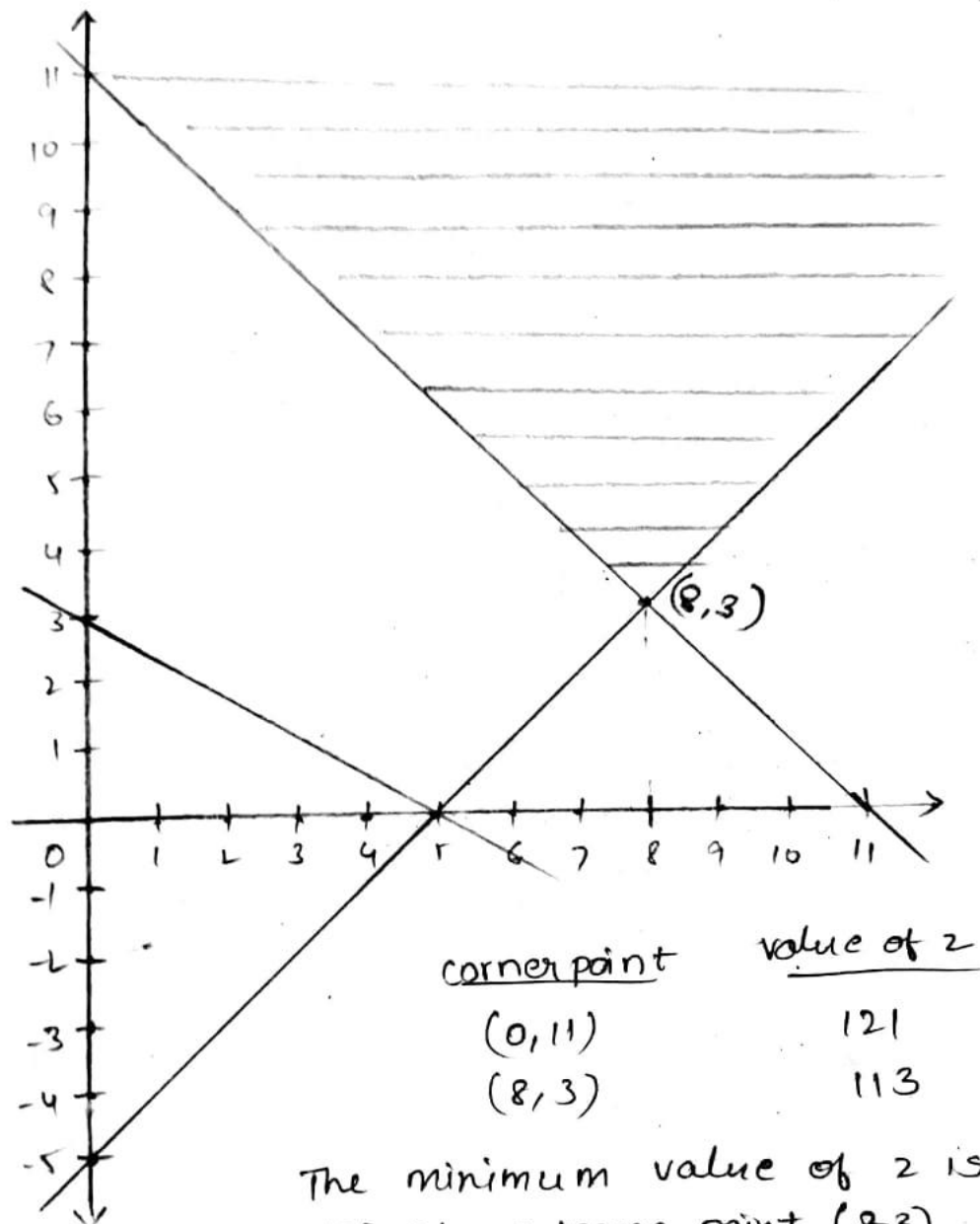
Hence the optimal solution to given LP problem is $x_1 = 8$, $x_2 = 3$ and min z = 113.

2. Demonstrate the Simplex method in Linear Programming.

QUESTION:
Maximize: P=40x1+35x2
Subject To:
      x1 +x2 <=24
      3x1 +2x2<=60
      X1,x2 >=0

post - Lab

2.   Maximize : $P = 40x_1 + 35x_2$

     Subject To : $x_1 + x_2 \leq 24$

                $3x_1 + 2x_2 \leq 60$

                $x_1, x_2 \geq 0$

   Adding slack variables

     $x_1 + x_2 + S_1 = 24$

     $3x_1 + 2x_2 + S_2 = 60$

objective function $P = 40x_1 + 35x_2 + 0S_1 + 0S_2$

Initial table

CB_i	C_j	40	35	0	0		Ratio Min
	Basic variable	x_1	x_2	S_1	S_2	Sol	
0	S_1	1	1	1	0	24	24
0	S_2	③	2	0	1	60	20
	z_j	0	0	0	0		
	$C_j - z_j$	40	35	0	0		

Iteration - 1

CB_i	C_j	40	35	0	0		
	Basic variable	x_1	x_2	S_1	S_2	Sol	
0	S_1	0	1/3	1	$-1/3$	4	12
40	x_1	1	2/3	0	1/3	20	30
	z_j	40	80/3	0	40/3		
	$C_j - z_j$	0	25/3	0	$-40/3$		

Iteration - 2

C_{Bi}	C_j	40	35	0	0	
	Basic variables	x_1	x_2	s_1	s_2	Sol
35	x_2	0	1	3	-1	12
40	x_1	1	0	-2	1	12
	z_j	40	35	25	5	
	$c_j - z_j$	0	0	-25	-5	

$$\therefore \quad x_1 = 12 \quad x_2 = 12$$

$$P = 40(12) + 35(12)$$

$$= 480 + 420$$

$$P = 900$$