SOLUTION WORKSHEET - 1 LPP (1)

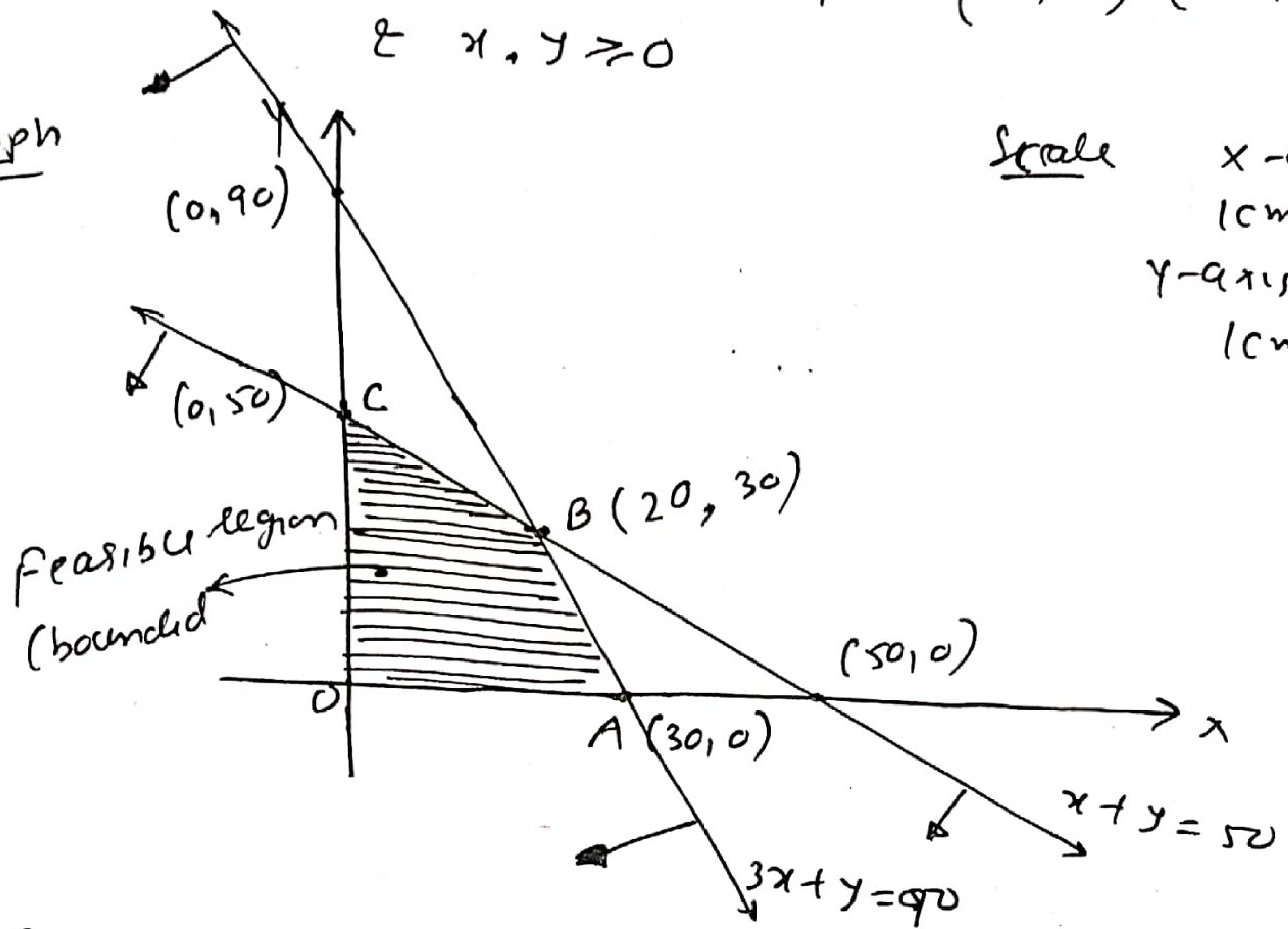
Ans 1 → Maximize $Z = 4x + y$

Such that $x + y \le 50$ points $(0,50)$, $(50,0)$ soln: towards

$3x + y \le 90$ points $(0,90)$ $(30,0)$ soln: Towards

& $x, y \ge 0$

graph



Scale x-axis 1cm = 10units

y-axis 1cm = 10units.

Corner points	value of objective function $Z = 4x + y$
A (30, 0)	$Z = 120$ ←
B (20,30)	$Z = 80 + 30 = 110$
C (0,50)	$Z = 0 + 50 = 50$

∴ Z is Maximum at $(30, 0)$ & Max. $Z = 120$ **Ans**

Ans 2 → Maximize & Minimize

$Z = 3x + 9y$

Such that $x + 3y \le 60$ points $(0,20)$, $(60,0)$ Soln: Towards

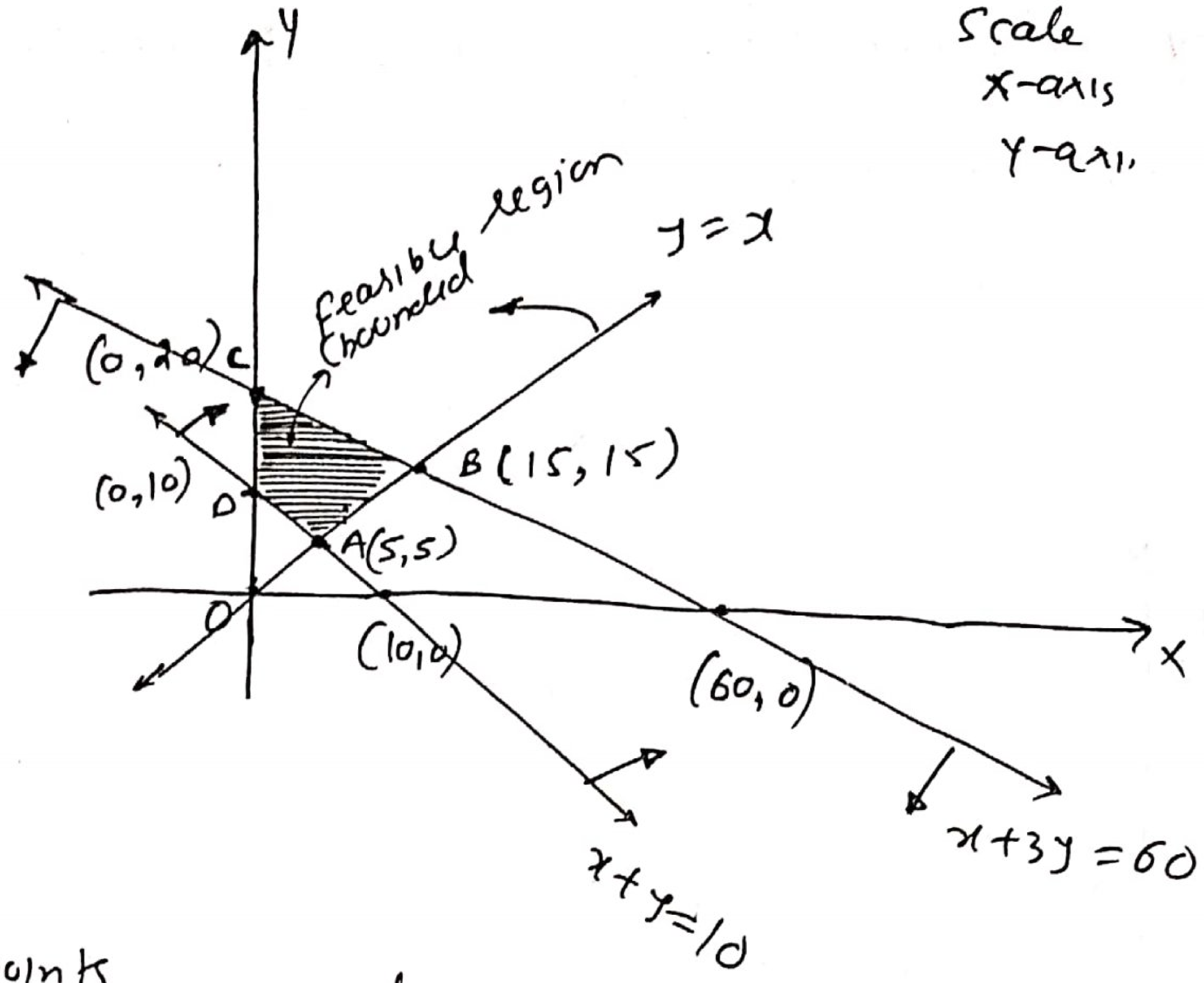
$x + y \ge 10$ points $(0,10)$, $(10,0)$ soln away

$x \le y$ $(0,0)$, $(10,10)$ soln. towards Y-axis

$x, y \ge 0$

Scanned with CamScanner

Graph



Scale
x-axis 1cm = 10units
y-axis 1cm = 10units

Corner points	value of objective function $Z = 3x + 9y$	
A (5,5)	$Z = 15 + 45 = 60$	← Min
B (15,15)	$Z = 45 + 135 = 180$	← Max
C (0,20)	$Z = 0 + 180 = 180$	← Max
D (0,10)	$Z = 0 + 10 = 90$	

Z is Minimum at (5,5) and Minimum value Z = 60

Z is Maximum at all the points on the line joining (15,15) & (0,20) & Max. Z = 180 Ans

Ans: 3 → Minimize & Maximize

$Z = 5x + 10y$

Such that

$x + 2y \le 120$ points (0, 60) (120,0) ; soln: Towards

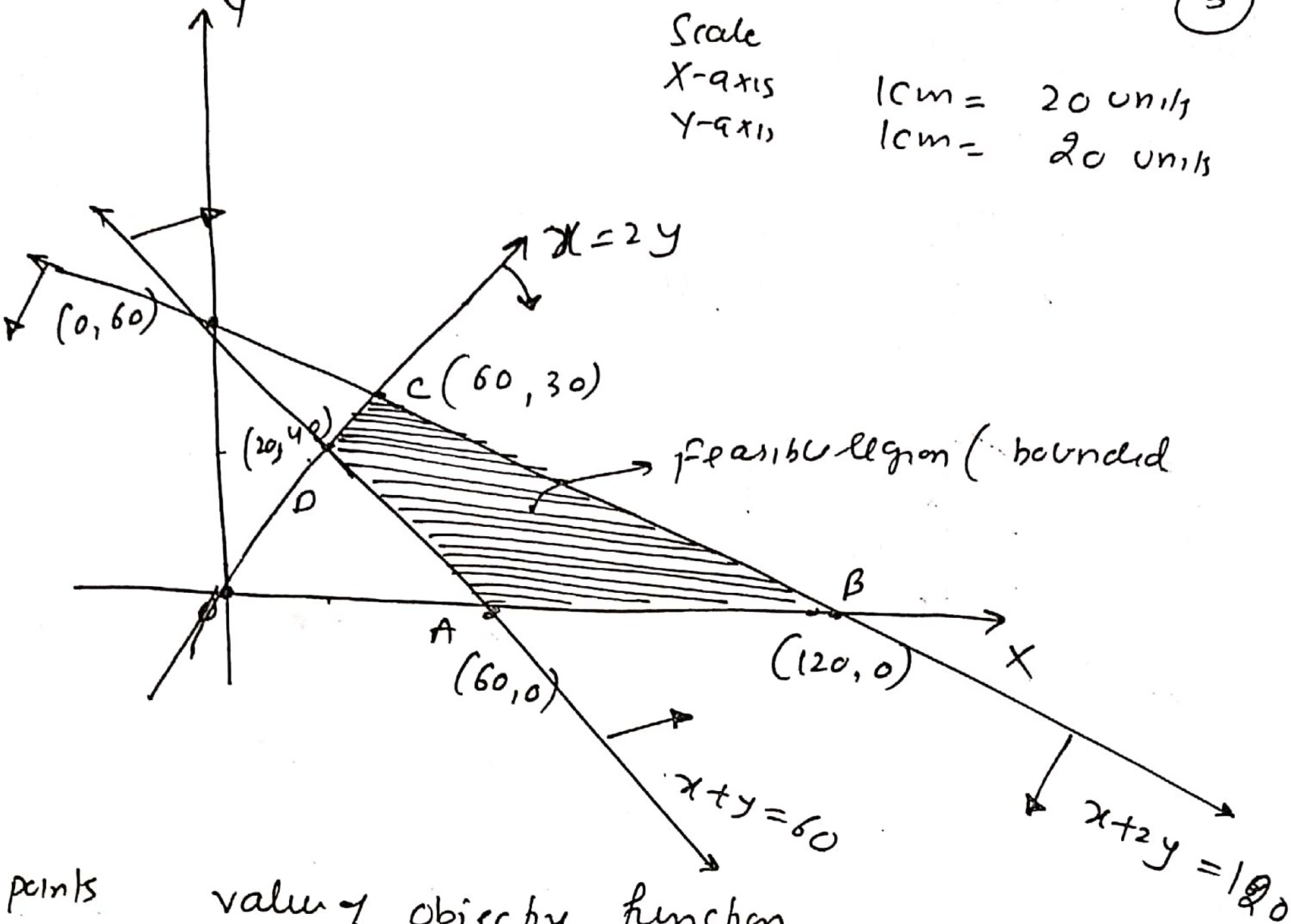
$x + y \ge 60$ points (0, 60) (60,0) : soln. away

$x - 2y \ge 0$ OR $x \ge 2y$ points (0,0) (40,20) soln: Towards x-axis

$x, y \ge 0$

Graph

Scale
X-axis 1cm = 20 units
Y-axis 1cm = 20 units



Corner points	value of objective function $Z = 5x+10y$
A (60, 0)	$Z = 300$ ← Min
B (120, 0)	$Z = 600$ ← Max
C (60, 30)	$Z = 300+300 = 600$ ← Max
D (20, 40)	$Z = 100+400 = 500$

$\therefore$ Z is Minimum at (60, 0) & Minimum $Z = 300$

Z is Maximum at all the points on the line joining (120, 0) & (60, 30) & Maximum $Z = 600$ Ans

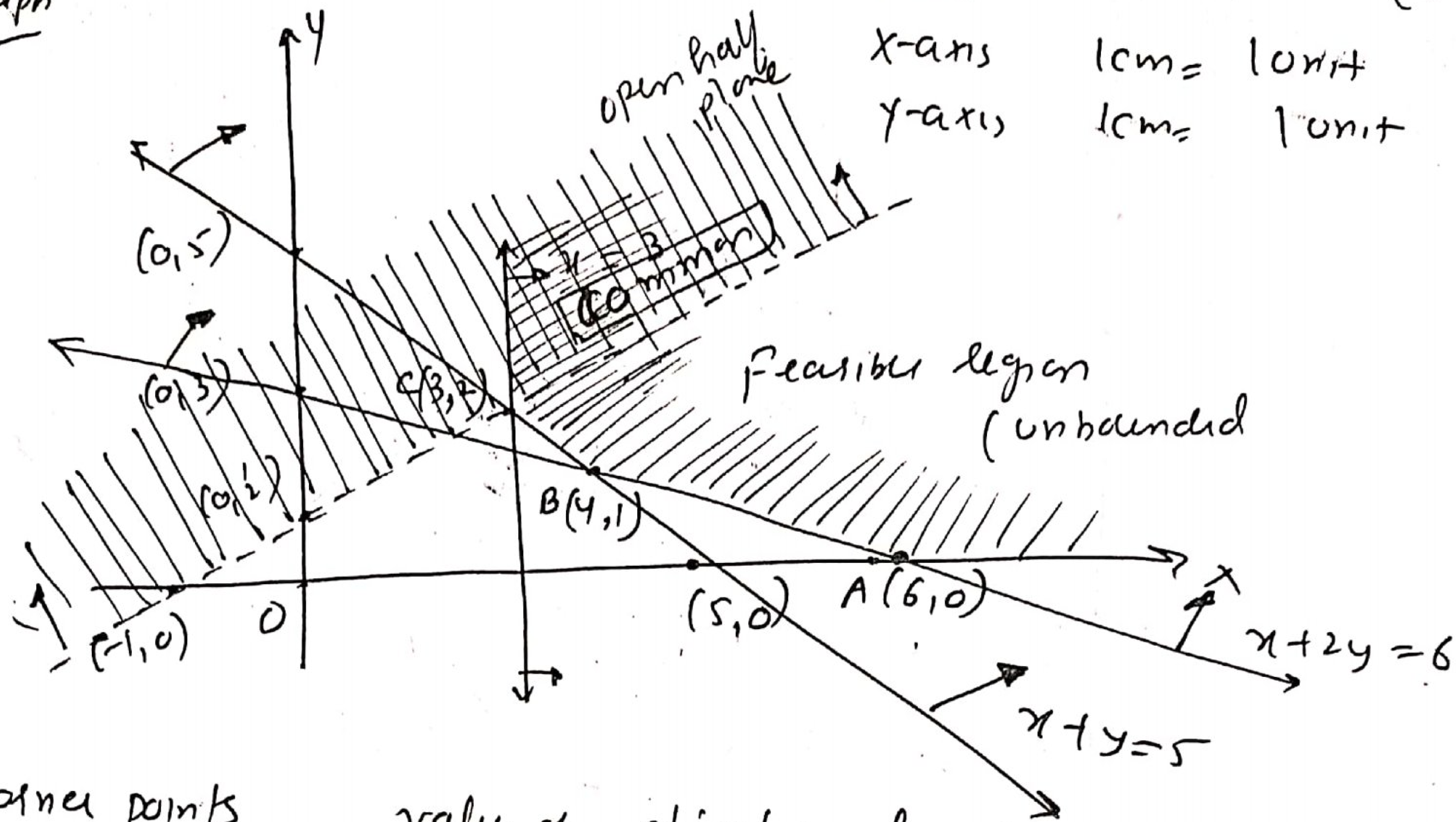
Qns 4 *

Maximize

$$Z = -x+2y$$

Such that
$x \geq 3$ ‖ to Y-axis at (3, 0) soln: away
$x+y \geq 5$ Points (0, 5), (5, 0) soln: away
$x+2y \geq 6$ points (0, 3) (6, 0) soln: away
$x, y \geq 0$

graph



corner points value of objective function

$$Z = -x + 2y$$

corner points	$Z = -x + 2y$
$A(6,0)$	$Z = -6+0 = -6$
$B(4,1)$	$Z = -4+2 = -2$
$C(3,2)$	$Z = -3+4 = 1 \leftarrow$

$$-x + 2y > 1$$

points $(0, \frac{1}{2})$; $(-1, 0)$

solution $0 > 1$ (away from origin)

Clearly feasible region and open half plane has common region

$\therefore$ Z cannot be Maximized subject to the given constraints Ans

ANS 5 → Maximize

$$Z = x + y$$

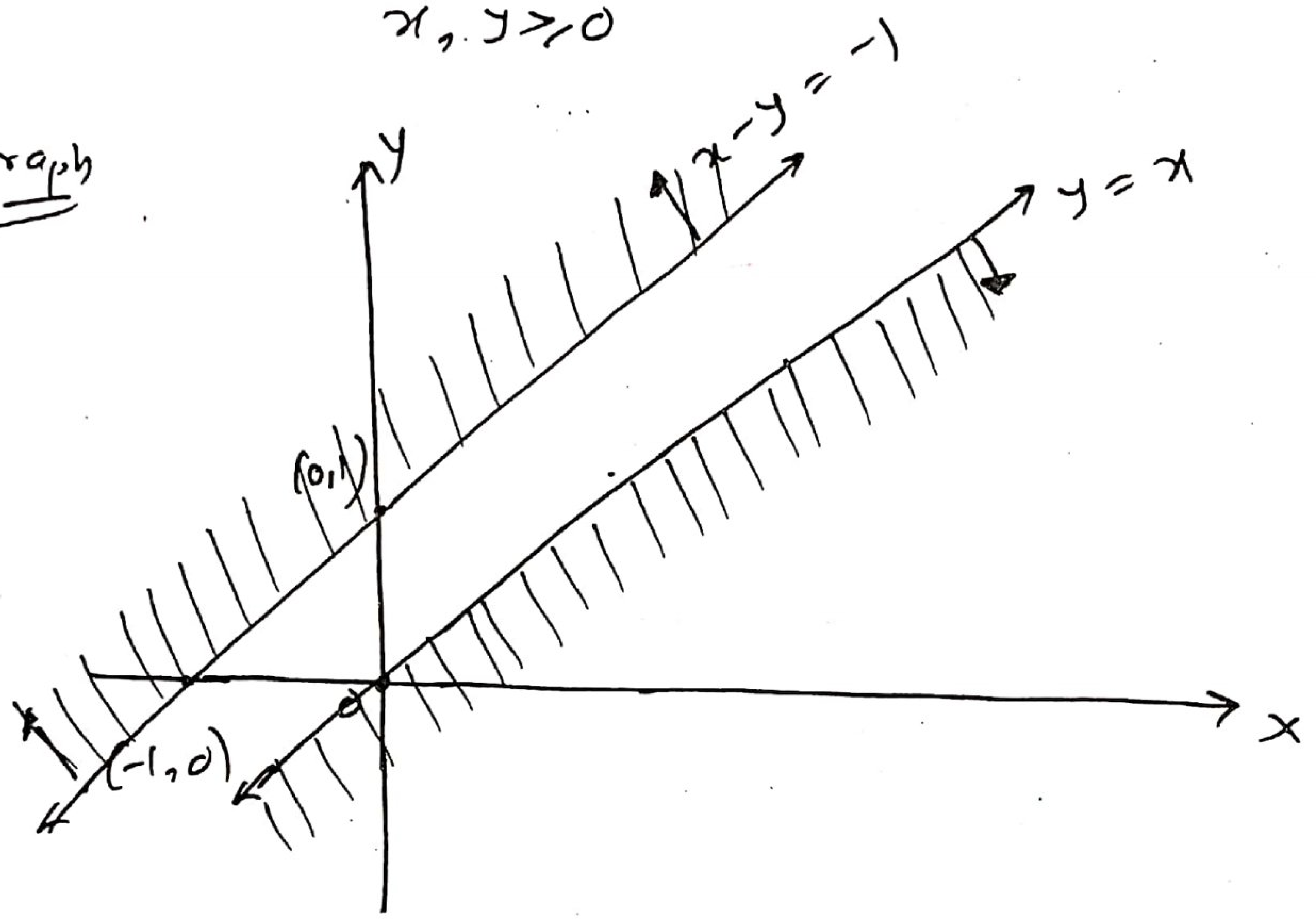
Such that $x - y \leq -1$ points $(0, 1)$ $(-1, 0)$ soln: away

$-x + y \leq 0$ points $(0, 0)$ $(1, 1)$ soln: Towards x-axis

OR $y \leq x$

$x, y \geq 0$

Graph



Scale

x-axis

1cm = 1unit

y-axis

1cm = 1unit

No feasible Region

∴ No corner points

Hence Z cannot be Maximized ANS