Linear Programming

1

eq. given
↓
Condition
↓
graph
↓
Expression → max / min

2

Statement → logical
↓
eq. create
↓
Condition
↓
Graph
↓
Solu. of eq. → max / min

Ans: Solve the following L.P. Problems:

So here at (4,0) → Z has minimum value i.e. Z = −12

(So the area region is bounded here)

~~maximum~~ minimise → $\boxed{Z = -3x + 4y}$

Subject to :- $x + 2y \le 8$ — (1)

$3x + 2y \le 12$ — (2)

$x \ge 0$ — (3)

$y \ge 0$ — (4)

Now $Z = -3x + 4y$

Point	Z
(0,0)	Z = 0
(0,4)	Z = 16
(2,3)	Z = 6
(4,0)	Z = −12

Solⁿ:-

from eq. (1): $\boxed{x + 2y \le 8}$

	A	B	
x	0	8	4
y	4	0	2

put (0,0) in eq. (1)

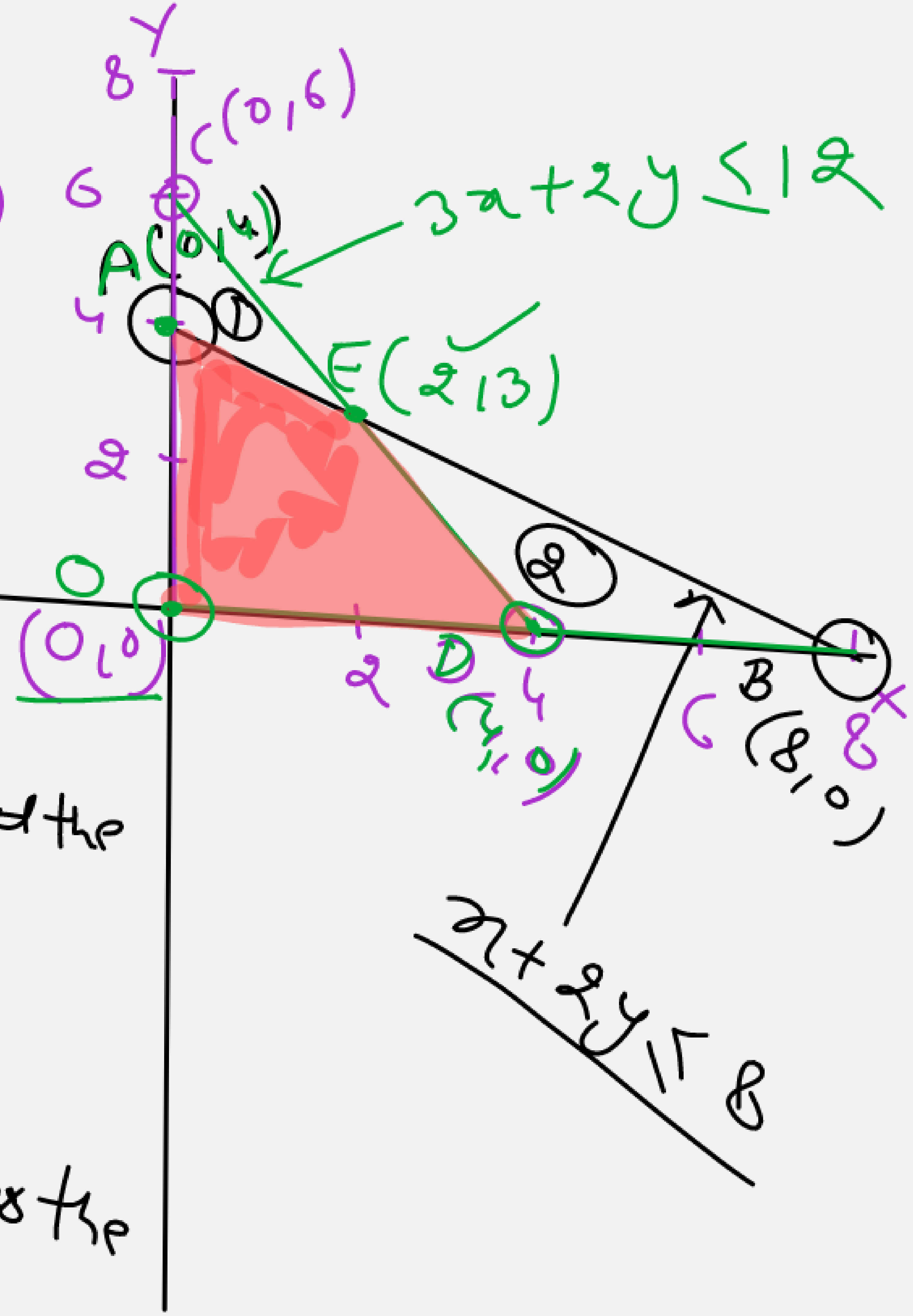
$\boxed{0 \le 8}$ → True → area toward the origin

from eq. (2): $3x + 2y \le 12$

	C	D	
x	0	4	
y	6	0	

put (0,0) →

$0 \le 12$ → True → area towards the origin



Q. minimize & maximize $Z = 5x + 10y$

subject to :- $x + 2y \le 120$ — (1)

$x + y \ge 60$ — (2)

$x - 2y \ge 0$ — (3)

$x, y \ge 0$ — (4)

Sol^n :- $0 - 60 \ge 0$ → false

From (1) :-

	A	B
x	0	120
y	60	0

→ at (0,0)
$0 \le 120$ → True
↳ area → origin

From (2) :-

	C	D
x	0	60
y	60	0

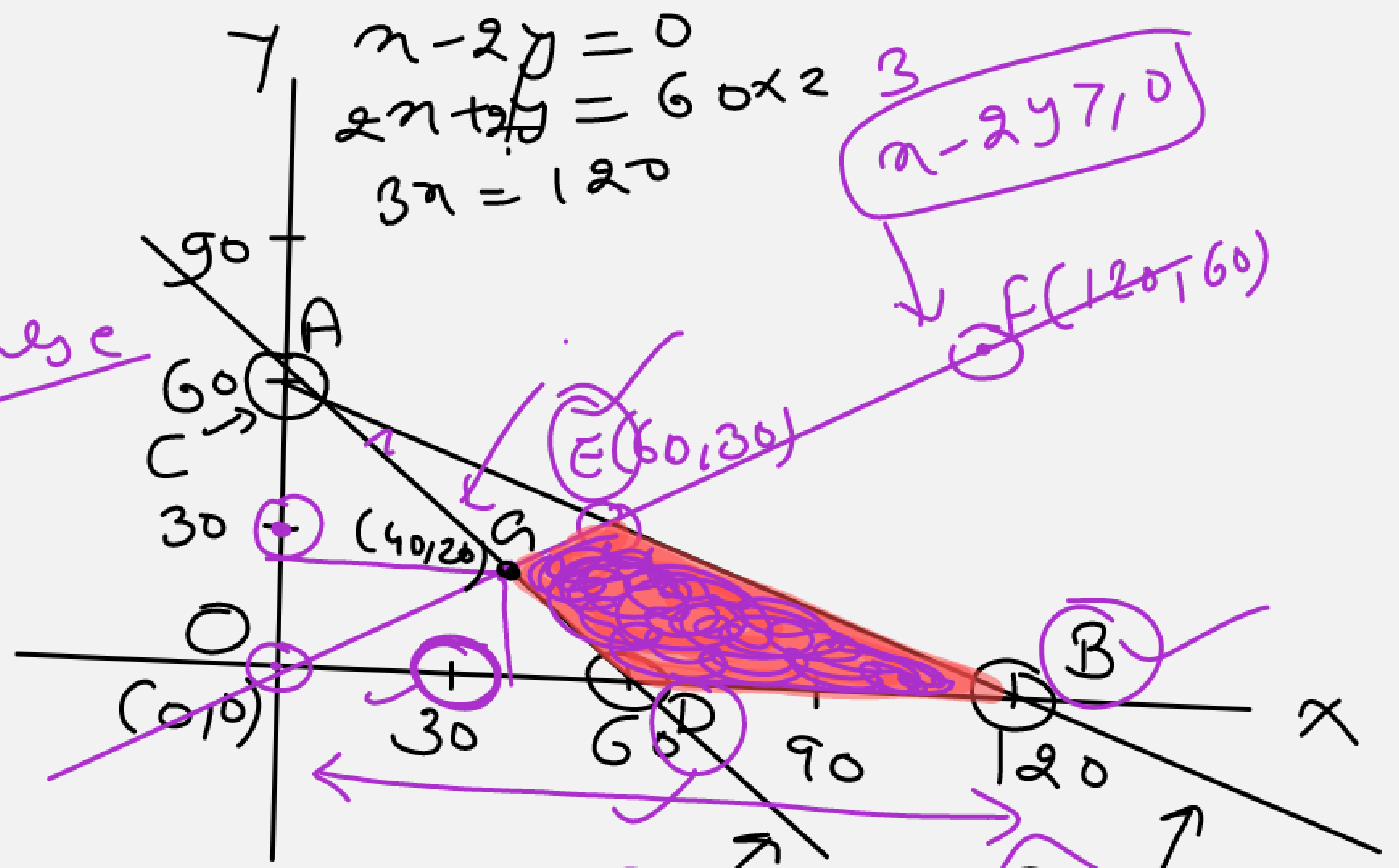
→ at (0,0)
$0 \ge 60$ → False
↳ area → opposite to origin

From (3) :-

x	60	120	0
y	30	60	0
	↓ E	↓ F	

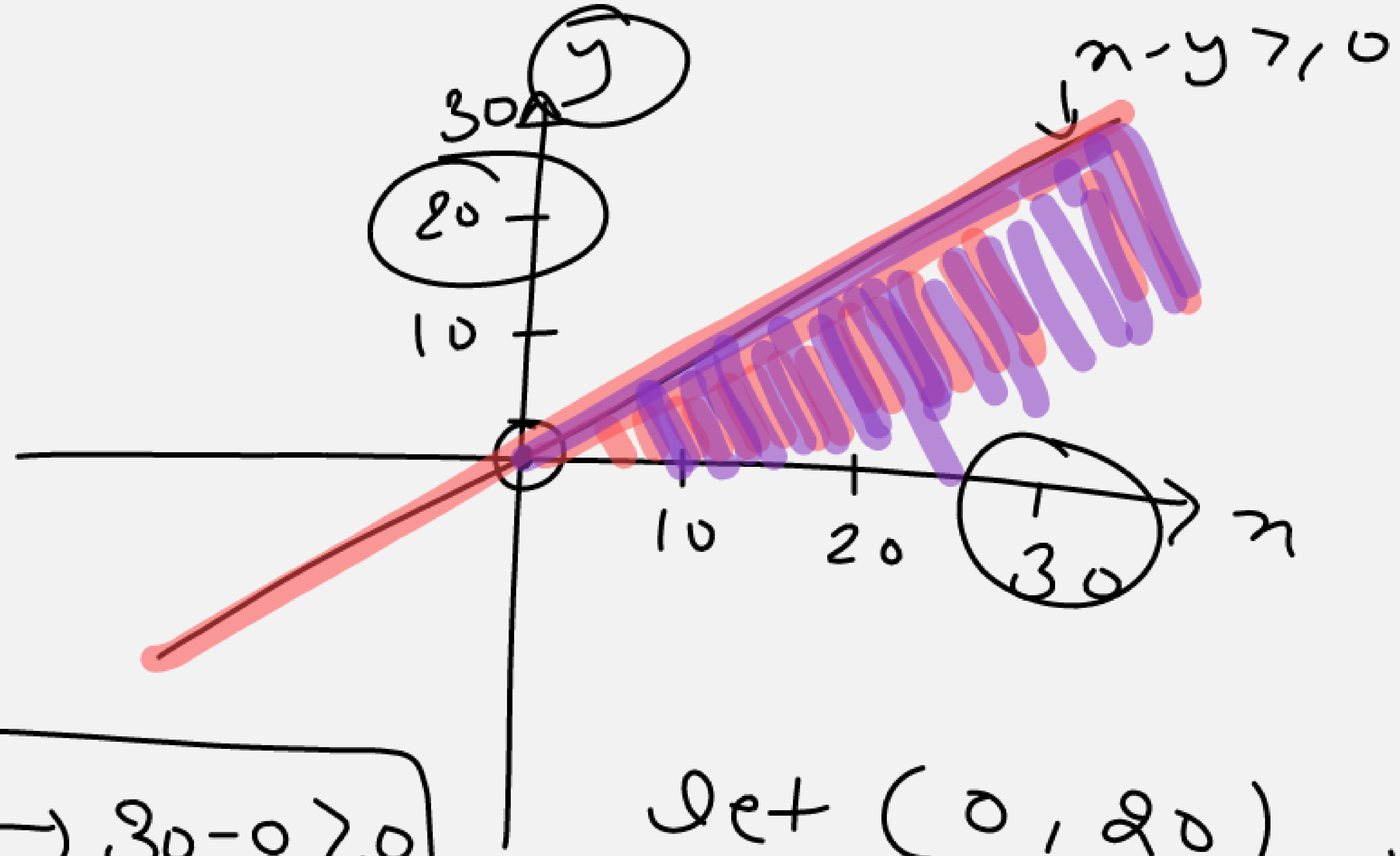
→ if we put (30,0)
$30 - 2(0) \ge 0$ → $30 \ge 0$
its true → Towards (30,0)

$x - 2y = 0$
$2x + 2y = 60 \times 2$
$3x = 120$



Sol :- area is bounded.

Points	Z =
G(40,20)	Z = 400
E(60,30)	Z = 600
B(120,0)	Z = 600
D(60,0)	Z = 300



$x - y \geq 0$

x	0	10	20
y	0	10	20

$(0,0) \rightarrow \boxed{0 \geq 0}$

Let $(0, 20) \rightarrow 0 - 20 \geq 0$

$-20 \geq 0 \rightarrow$ False

regim away from $(0,20)$

$(30,0) \rightarrow 30 - 0 \geq 0$

$\boxed{30 \geq 0}$

True.

Regim twards $(30,0)$