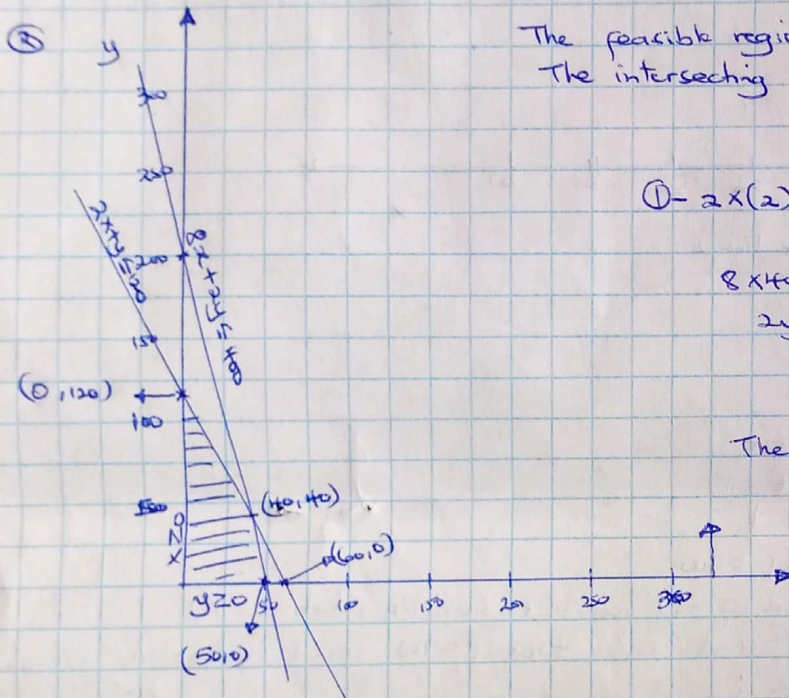


- ① x = number of tables produced per day
 y = Number of chairs produced per day

$8x + 2y \leq 400$ [To produce x tables required assembling hours = $8x$
 and to produce y chairs required assembly hours = $2y$
 Total = $8x + 2y$ and available time = 400

$2x + y \leq 120$ [To produce x tables required finishing hrs $2x$ & to
 produce y chairs required finishing hours y . Total
 finishing hours = $2x + y$ and available finishing
 hours = 120

$x, y \geq 0$ i.e. number of tables and chairs can't be negative



The feasible region is bounded

The intersecting point of $8x + 2y = 400$ -- ①
 $2x + y = 120$ -- ②

$$\text{①} - 2 \times \text{②} : 4x = 160$$

$$x = 40$$

$$8 \times 40 + 2y = 400$$

$$2y = 80$$

$$y = 40$$

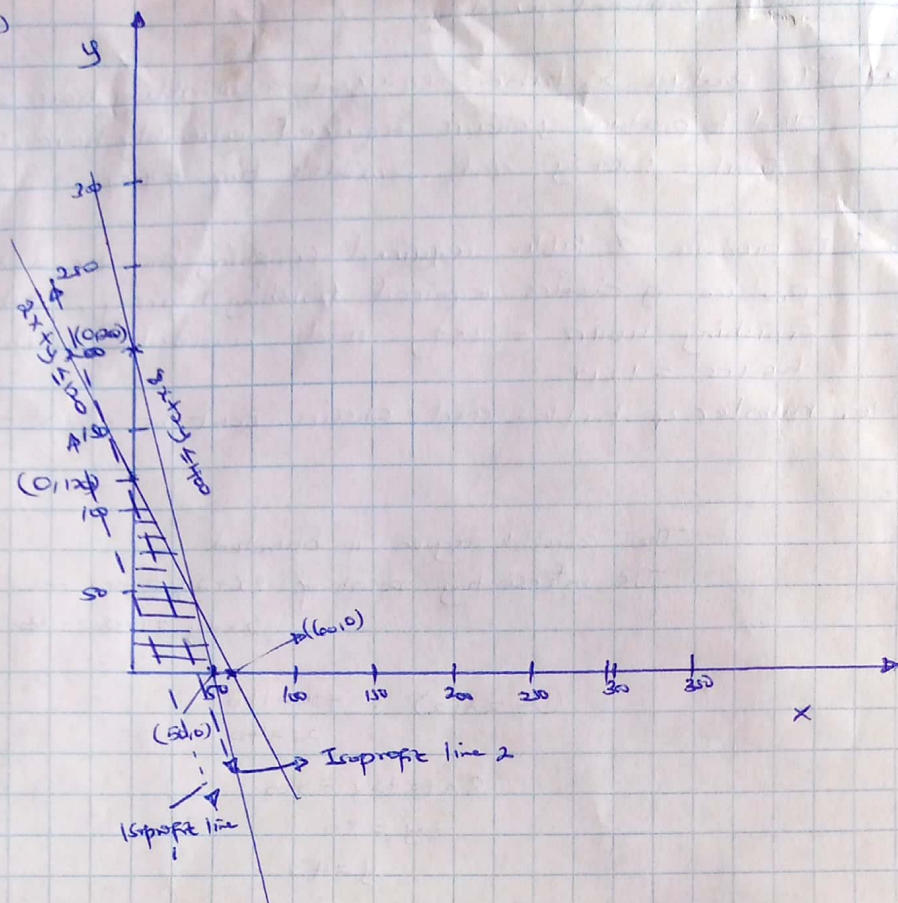
The point is $(40, 40)$

- ③ If the solution satisfies $x \geq 0, y \geq 0, 8x + 2y \leq 400, 2x + y \leq 120$ then the solution will be feasible sol. Now use form table.

	x	y	$x \geq 0$	$y \geq 0$	$8x + 2y \leq 400$	$2x + y \leq 120$	Conclusion
a) 20 tables 80 chairs	20	80	20 ≥ 0 satisfied	80 ≥ 0 satisfied	$8 \times 20 + 2 \times 80 = 320 \leq 400$ satisfied	$2 \times 20 + 80 = 120 \leq 120$ satisfied	feasible solution
b) 50 tables 150 chairs	50	150	50 ≥ 0 satisfied	150 ≥ 0 satisfied	$8 \times 50 + 2 \times 150 = 500 > 400$ Not satisfied	$2 \times 50 + 150 = 150 > 120$ Not satisfied	Not feasible as it violates 3rd and 4th constraints
c) 0 tables 0 chairs	0	0	0 ≥ 0 satisfied	0 ≥ 0 satisfied	$8 \times 0 + 2 \times 0 = 0 \leq 400$ satisfied	$2 \times 0 + 0 = 0 \leq 120$ satisfied	feasible solution
d) -15 tables -20 chairs	-15	-20	-15 < 0 Not satisfied	-20 < 0 Not satisfied	$8 \times (-15) + 2 \times (-20) = -160 \leq 400$ satisfied	$-15 \times 2 + (-20) = -50 \leq 120$ satisfied	Not feasible solution as it violates 1st and 2nd constraints
e) 5 tables 100 chairs	5	100	5 ≥ 0 satisfied	100 ≥ 0 satisfied	$5 \times 8 + 100 \times 2 = 240 \leq 400$ satisfied	$2 \times 5 + 100 = 110 \leq 120$ satisfied	Feasible sol.
f) 45 tables 30 chairs	45	30	45 ≥ 0 satisfied	30 ≥ 0 satisfied	$8 \times 45 + 2 \times 30 = 420 > 400$ Not satisfied	$2 \times 45 + 30 = 120 \leq 120$ satisfied	Not feasible sol as it violates 3rd constraint

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Q1



x table producer \$6000 profit

y table producer \$200 profit

Total profit = $60x + 20y$

Isoprofit line 1 : $60x + 20y = 900$

(15, 0) and (0, 45) are two feasible solutions as

$(15)(60 + 0)(20) = 900$ and $0(60) + 20(45) = 900$ and also it lies within feasible region since :

(15, 0) $x \geq 0, y \geq 0$

$15 \geq 0, x \geq 0$ satisfied

$0 \geq 0, y \geq 0$ satisfied

$8(15) + 0(20) \leq 400$ i.e. $120 \leq 400$ satisfied $8x + 2y \leq 400$ satisfied

$2(15) + 0 = 30 \leq 120$ satisfied ($2x + y \leq 120$ satisfied)

0, 45 $x = 0, y = 45$

$0 \geq 0, x \geq 0$ satisfied

$45 \geq 0, y \geq 0$ satisfied

$8(0) + 2(45) = 90 \leq 400 \rightarrow 8x + 2y \leq 400$ satisfied

$2(0) + 45 = 45 \leq 120, 2x + y \leq 120$ satisfied.

Isoprofit line 2 $60x + 20y = 2100$

(35, 0) and (0, 105) are 2 feasible solutions as

$60(35) + 20(0) = 2100$ and $60(0) + 20(105) = 2100$ and also it lies within

the feasible region

$35 \geq 0, x \geq 0$ satisfied

$105 \geq 0, y \geq 0$ satisfied

(0, 105)

$8(0) + 2(105) = 210 \leq 400$

$2(0) + 105 = 105 \leq 120$

$8x + 2y \leq 400$ satisfied

$2x + y \leq 120$ satisfied

(35, 0)

$35 \geq 0, x \geq 0$ satisfied

$0 \geq 0, y \geq 0$ satisfied

$8(35) + 2(0) = 280 \leq 400, 8x + 2y \leq 400$ satisfied

$2(35) + 0 = 70 \leq 120, 2x + y \leq 120$ satisfied

(b) Corner points of the feasible region

$$(0,0) \rightarrow \text{profit at } (0,0) = 60 \times 0 + 20 \times 0 = 0$$

$$(50,0) \rightarrow \text{profit at } (50,0) = 60 \times 50 + 20 \times 0 = 3000$$

$$(40,40) \rightarrow \text{profit at } (40,40) = 60 \times 40 + 20 \times 40 = 3200$$

$$(0,120) \rightarrow \text{profit at } (0,120) = 60 \times 0 + 20 \times 120 = 2400$$

Maximum profit is therefore obtained by producing
40 tables and 40 chairs
profit = \$3200