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① Wild west produces two types of cowboy hats. A type 1 hat requires three times as much labor time as a type 2. If the all available labor time is dedicated to type 2 alone, the company can produce a total 450 type 2 hats a day. The market limits for the two types are 100 and 300 hats per day for Type 1 and type 2. The profits are \$8 for type 1 and \$5 per type 2 hat. Determine the number of hats of each type that would maximize profit

A. Build the mathematical model for the problem

B. Solve the problem graphically.

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p. Mathematical Model

Number of type 1 hat $\Rightarrow x$

Number of type 2 hat $\Rightarrow y$

total profit $\Rightarrow z$

labor time limits

x labor time = 3. (y labor time)

total labor time = 450. y

market limits

$x \leq 100$, $y \leq 300$

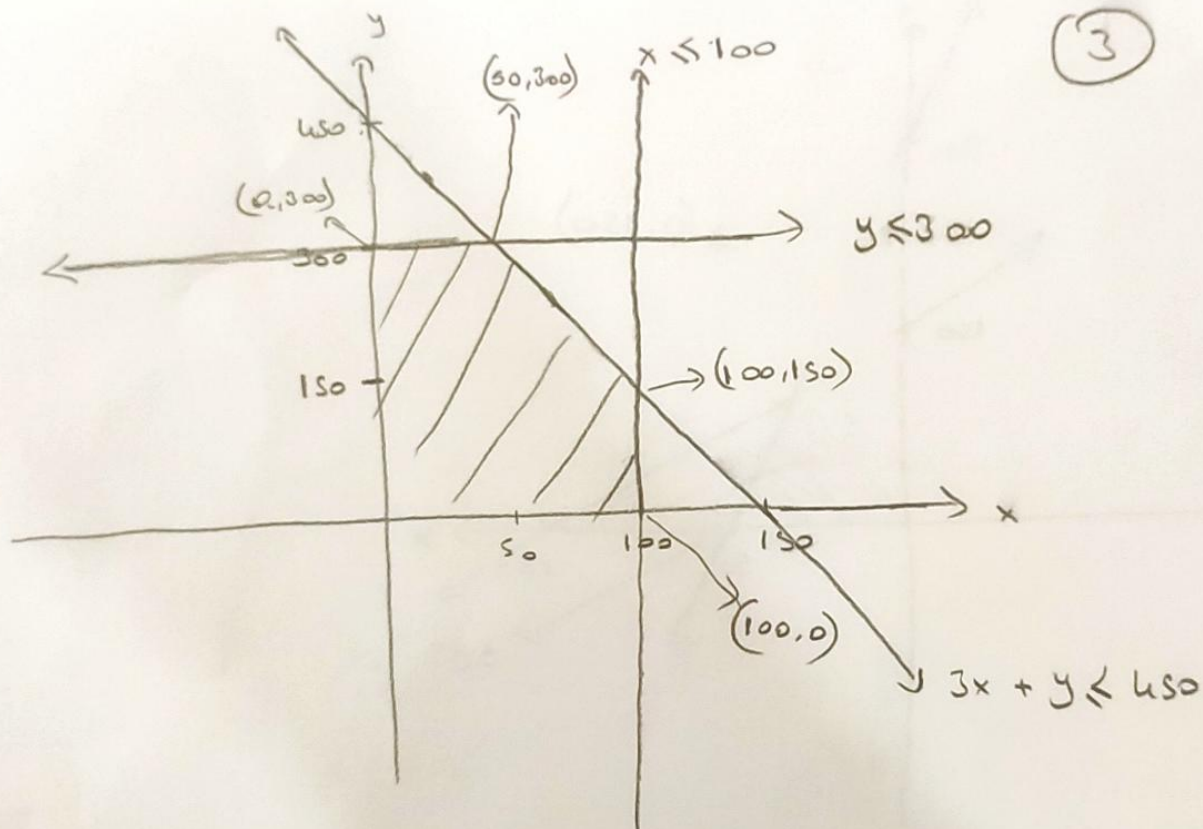
profits

$x = 8\$$

$y = 5\$$

$z = 8x + 5y$

$$\begin{array}{l} 3x + y \leq 450 \\ x \leq 100 \\ y \leq 300 \\ 8x + 5y = z \end{array}$$



so we have 4 intersection points

- 1 \rightarrow (0, 300) if $x=0$ $y=300$ 2 will be 1500 \$
- 2 \rightarrow (50, 300) if $x=50$ $y=300$ 2 will be 1500 \$
- 3 \rightarrow (100, 150) if $x=100$ $y=150$ 2 will be 1550 \$
- 4 \rightarrow (100, 0) if $x=100$ $y=0$ 2 will be 800 \$

So type 1 hat production should be 50 per day to maximize profits and type 2 should be 300 per day for some reason.

Type 1 hat production = 50

Type 2 hat production = 300