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(Q1) 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 of 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 respectively. The profit is 8 \$ per Type 1 hat and 5 \$ per type 2 hat. Determine the number of hats of each type that would maximize profit

- Build the mathematical model of the problem.
- Solve the problem graphically.

i.

$x = \text{Type 1 cowboy hats}$
 $y = \text{Type 2 cowboy hats}$

$$3x + y \leq L, \quad L \in \mathbb{Z}$$

$$x \leq 100$$

$$\text{Total revenue} = 8x + 5y$$

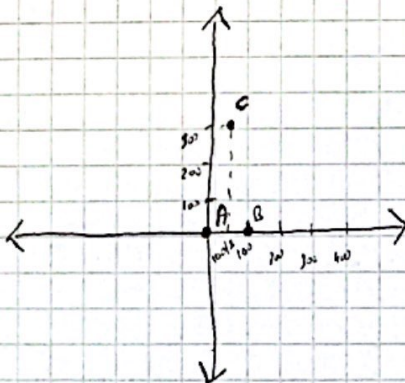
$$y \leq 300$$

$$\text{Total cost} = k(3x + y)$$

$$\text{Maximize: } 8x + 5y - k(3x + y)$$

$$\begin{cases} 3x + y \leq L \\ x \leq 100 \\ y \leq 300 \\ x, y \geq 0 \end{cases}$$

ii.



Points:
 $A = 0$
 $B = 800$
 $C = 1500$

$$x = 3(100/3) = 100 \text{ Type 1 hats}$$

$$y = 100/3 \text{ Type 2 hats}$$

$$\text{Max profit} = 1500 \$$$

