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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 of 450 Type 2 hats a day. The market limits for the two types are 100 and 200 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.
   i. Build the mathematical model of the problem.
   ii. Solve the problem graphically.

1.

x_1 = number of Type 1 hats
x_2 = " " 2 hats

T = required time for Type 2 hat
Type 1 need 3T time.

Objective $\Rightarrow$ $z = 8x_1 + 5x_2$ /maximize/

restricts

$$3T x_1 + T x_2 \leq 450T$$

$$\rightarrow \quad 3x_1 + x_2 \leq 450$$

$$\rightarrow \quad x_1 \leq 100$$

$$\rightarrow \quad x_2 \leq 200$$

$$x_1, x_2 \geq 0$$

$$x_1, x_2 \in \mathbb{N}$$

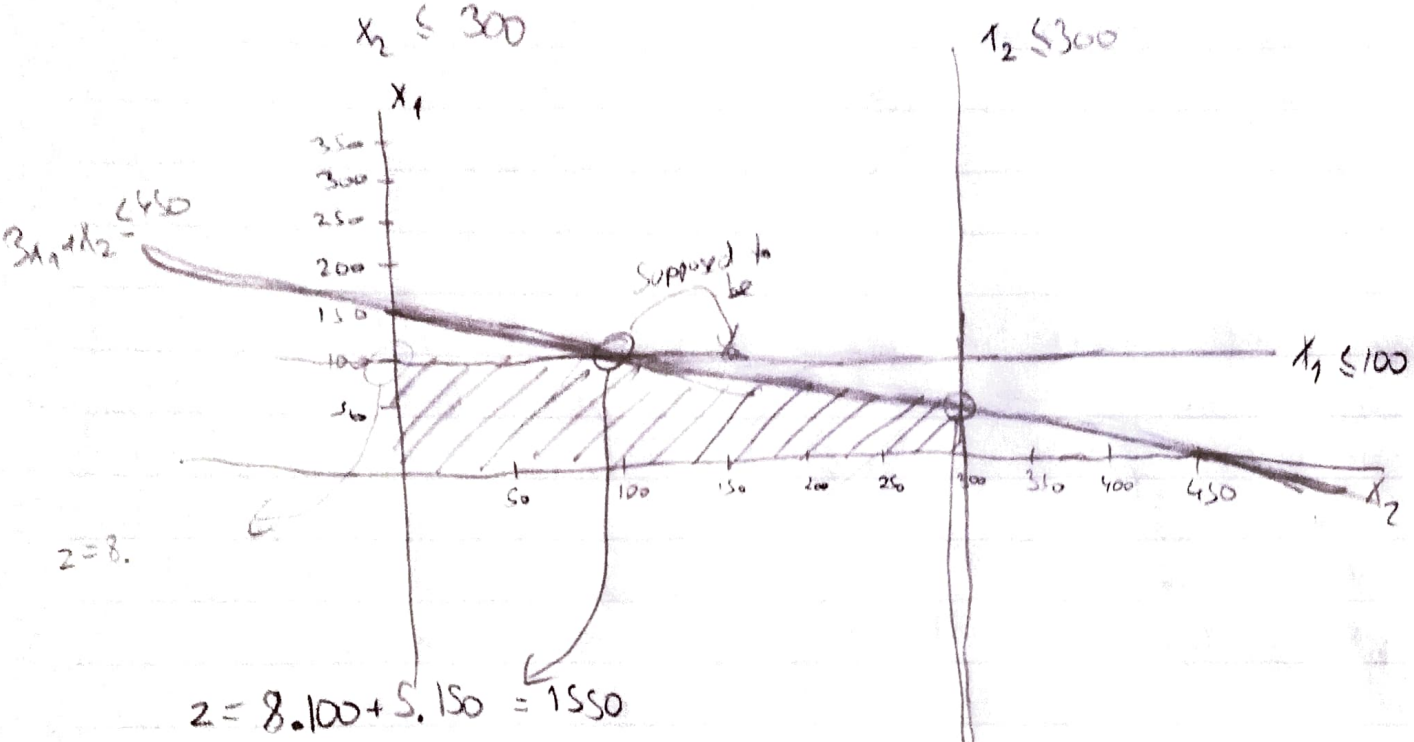
ii.

$z = 8x_1 + 5x_2$

$3x_1 + x_2 \leq 450$

$x_1 \leq 100$

$x_2 \leq 300$



$z = 8.$

$z = 8.100 + 5.150 = 1550$

(due to bad drawing)

it seems wrong

intersection $\begin{cases} 3x_1 + x_2 = 450 \\ x_1 = 100 \end{cases}$ $\begin{matrix} x_1 = 100 \\ x_2 = 150 \end{matrix}$

$x_2 \leq 300$

$z = 8.50 + 5.300 = 1900 \Rightarrow$ max profit