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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 type 2. If all the 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.

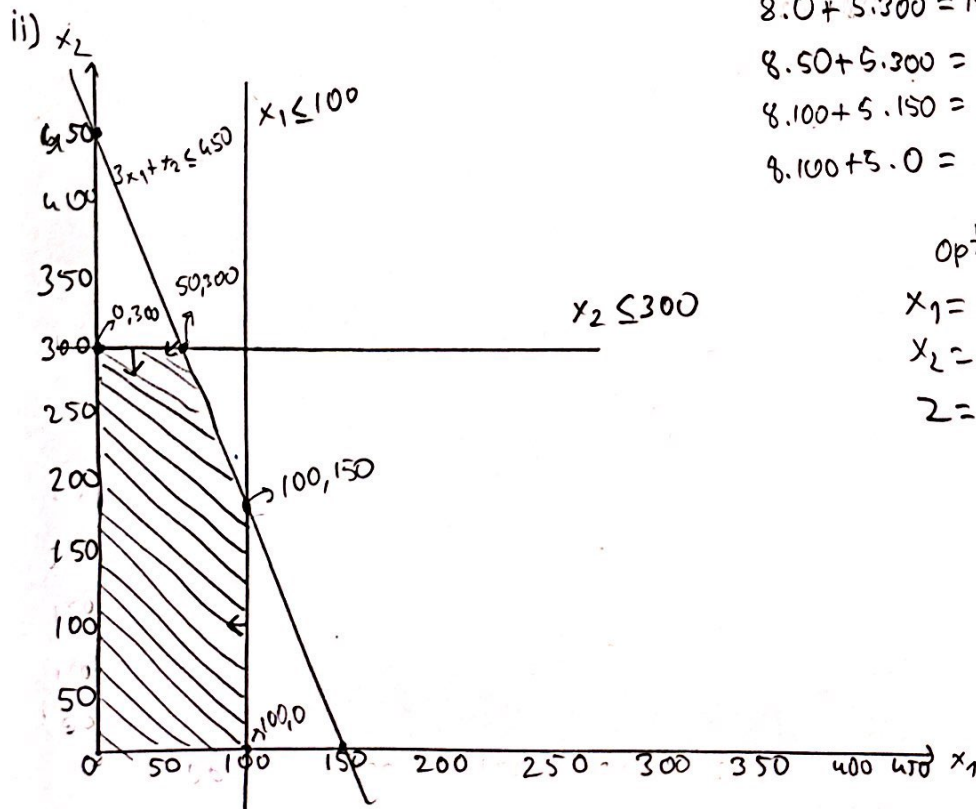
i) Build mathematical model of the problem

ii) Solve the problem graphically

i)  $x_1$  = number of type 1 hats produced daily  
 $x_2$  = number of type 2 hats produced daily

maximize  $z = 8x_1 + 5x_2$

st.  $3x_1 + x_2 \leq 450$   $x_1 \leq 100$   $x_2 \leq 300$   
 $x_1 \leq 100$   
 $x_2 \leq 300$   
 $x_1, x_2 \geq 0$



$$8 \cdot 0 + 5 \cdot 300 = 1500 \$$$

$$8 \cdot 50 + 5 \cdot 300 = 1900 \$ \Rightarrow \text{optimal}$$

$$8 \cdot 100 + 5 \cdot 150 = 1550 \$$$

$$8 \cdot 100 + 5 \cdot 0 = 800 \$$$

Optimal solution is:

$x_1 = 50$  type 1 hats daily

$x_2 = 300$  type 2 hats daily

$z = 1900 \$$  daily