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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 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 and 5 $ per type 2 hat. Determine the number of hats of each type that would maximize the profit.

i. Build mathematical model of the problem
ii. Solve the problem graphically.

i)

$X_1$ = Type 1 hat count
$X_2$ = Type 2 hat count

| | Type 1 $X_1$ | Type 2 $X_2$ |
|---|---|---|
| profit | 8 $ | 5 $ |
| limit | 100 | 300 |
| Time | 3T | T |

$X_1 \leq 100$
$X_2 \leq 300$
$X_1, X_2 \geq 0$
$3T X_1 + T X_2 \leq 450T$
$\hookrightarrow 3X_1 + X_2 \leq 450$

available hat a day = 450T

Goal is maximize the profit

$\Rightarrow$ maximize $z = 8X_1 + 5X_2$

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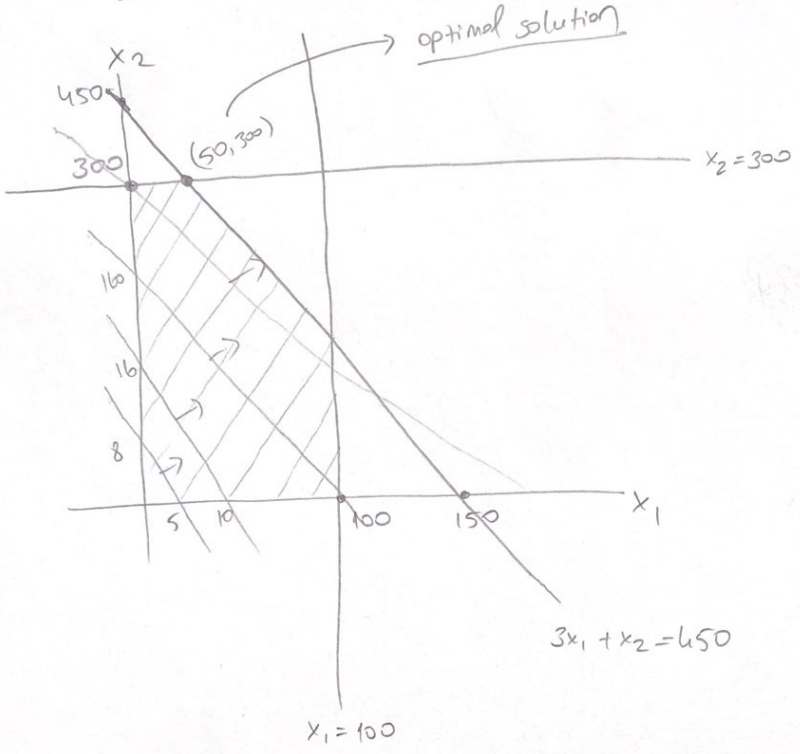
$x_1$ = Type 1 hat count
$x_2$ = Type 2 hat count




$x_1 = 50$ , $x_2 = 300$ optimal solution
max $z = 8 \cdot 50 + 5 \cdot 300 = 1900\$$