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Q) 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.

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

i. let,

x_1 = number of produces Type 1 hat

x_2 = number of produces Type 2 hat

constraints:

$x_1 \leq 100$

$x_2 \leq 300$

$3x_1 + x_2 \leq 450$

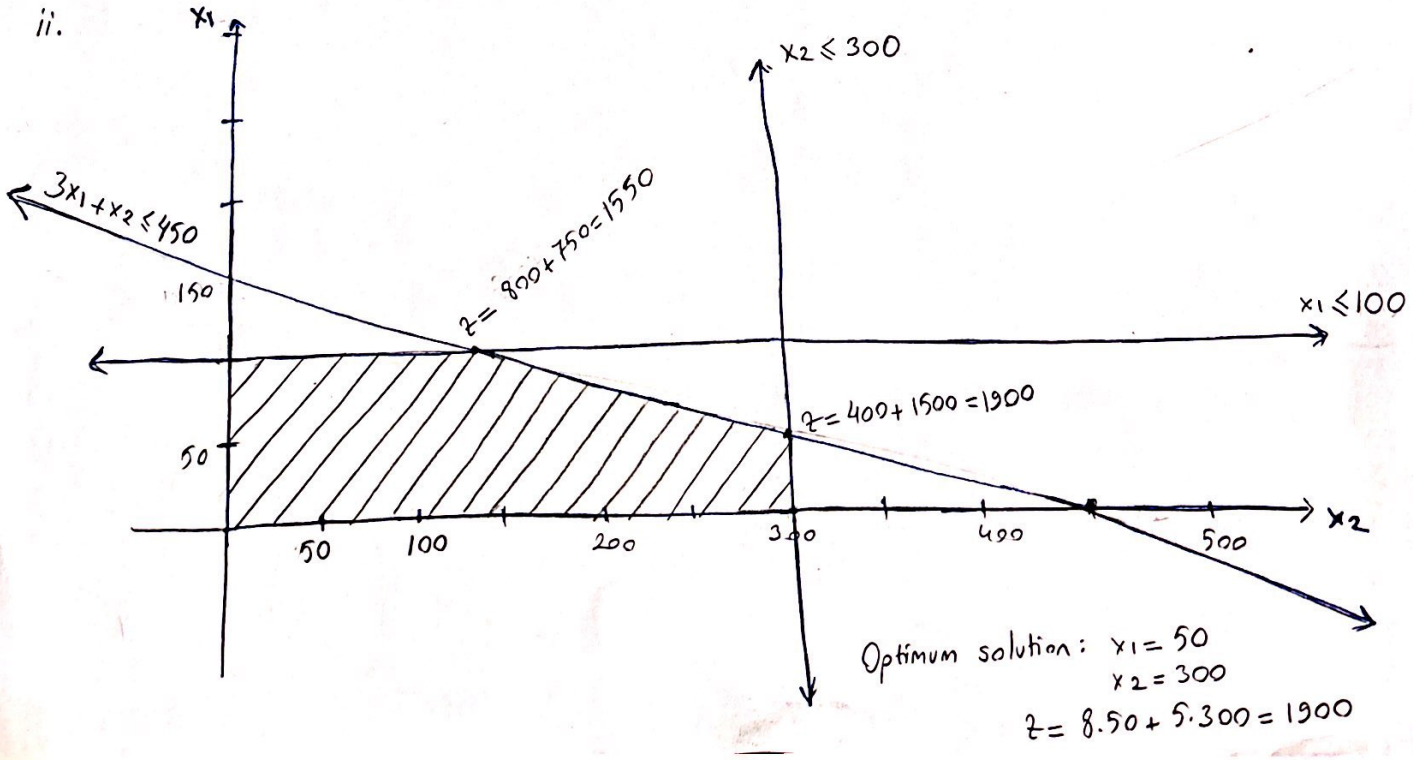
$x_1, x_2 \geq 0$ (non-negativity)

Goal: maximize profit

$z = 8x_1 + 5x_2$

total hour per day: 450 T
Type 1 needs 3T
Type 2 needs T
$3T x_1 + T \cdot x_2 \leq 450T$

ii.



Optimum solution: $x_1 = 50$
$x_2 = 300$
$z = 8 \cdot 50 + 5 \cdot 300 = 1900$