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Question 1

1. World west produces two types of cowboy hats A type 1 hat requires three times as much labor time as 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 and $5 for Type 2 hat. Determine the number of hats of each type that would maximize profit ?

1/

	labor	profit
Type 1	3t	$8
Type 2	t	$5

total labor = 450 t

Decision variable

x_1 = number of Type 1 hats

x_2 = number of Type 2 hats

Objective function

determine maximize the profit

max. $z = 8x_1 + 5x_2$

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constraints (s.t)

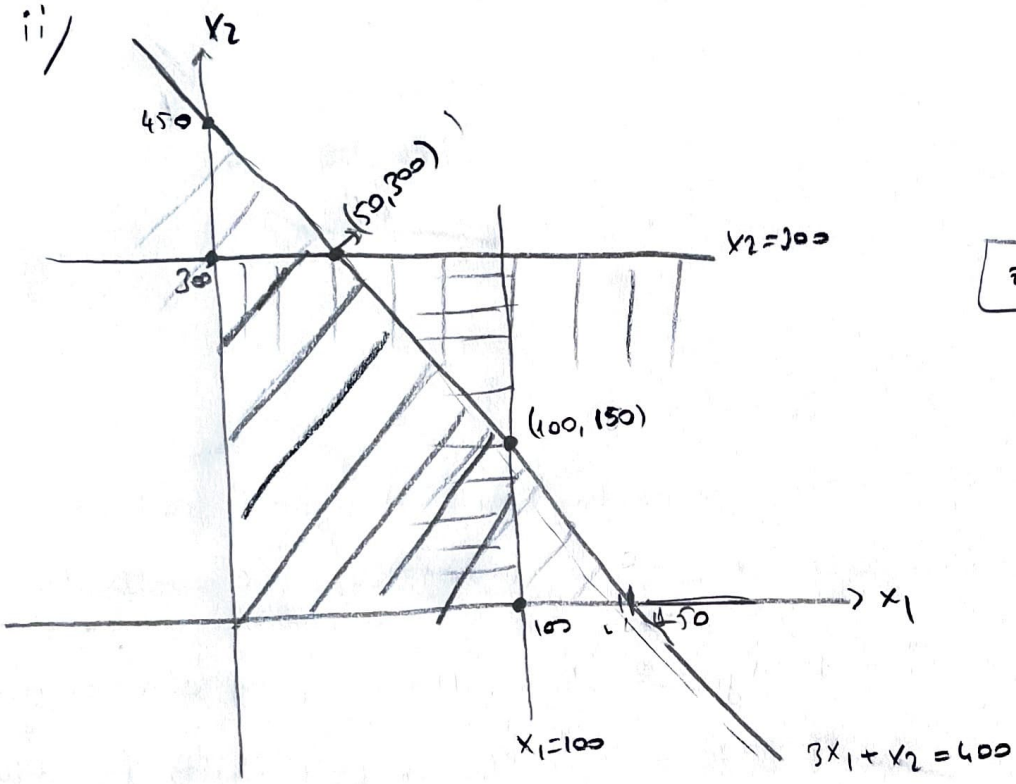
$x_1 \leq 100$

$x_2 \leq 300$

$3x_1 + x_2 \leq 450$

$x_1, x_2 \in N$

ii)



$z = 8x_1 + 5x_2$

Solution 1

$x_1 = 100 \quad x_2 = 0$

$z = 800 + 0 = \underline{800\$}$

Solution 2

$x_1 = 0 \quad x_2 = 300$

$z = 0 + 1500 = \underline{1500\$}$

Solution 3 → optimal

$x_1 = 50 \quad x_2 = 300$

$z = 400 + 1500 = \underline{1900\$}$

Solution 4

$x_1 = 100 \quad x_2 = 150$

$z = 800 + 750 = \underline{1550\$}$

* Solution 1, 2, 4 are feasible solutions.

* Solution 3 is optimal solution