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IE3035 QUIZ.1 April 26, 2023

Question:

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 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.

Type	Required Time
1	3T
2	T

Solution:

i. Let x_1: Number of Type 1 hat produced
x_2: Number of Type 2 hat produced

$450T \rightarrow$ All available labor time

$3Tx_1 + Tx_2 \leq 450T \rightarrow 3x_1 + x_2 \leq 450$

Model: Maximize $z = 8x_1 + 5x_2$

s.t.

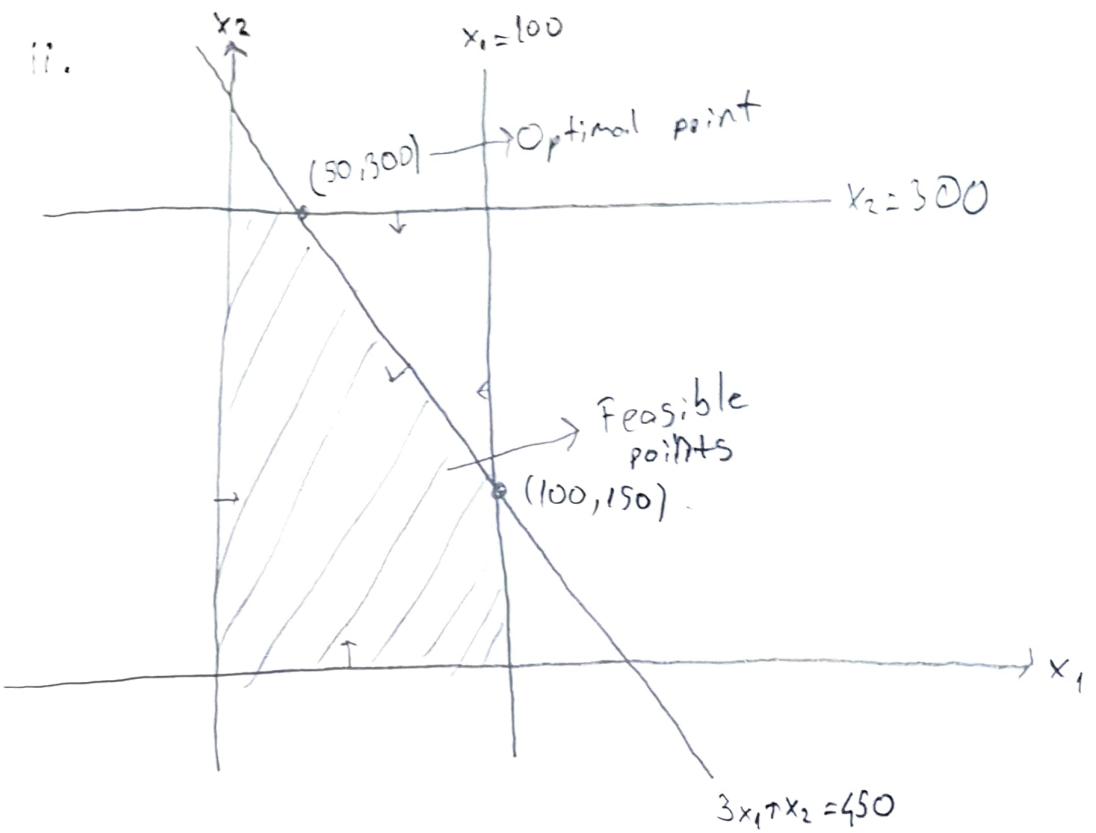
$3x_1 + x_2 \leq 450$

$x_1 \leq 100$

$x_2 \leq 300$

$x_1, x_2 \geq 0$

ii.



Optimal solution:

$x_1 = 50$

$x_2 = 300$

Profit = $8.50 + 5.300 = \$1900$