IE 335 QUIZ 1

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Question:

1 - Wild West produces two types of cowboy hats. A type 1 hat requires three times as much labor as type 2. If 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 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.

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Mathematical Model

i. Decision variables

x_1 : number of type 1 hats
x_2 : number of type 2 hats

Objective Function

$Z = 8x_1 + 5x_2$ (maximize)

Constraints

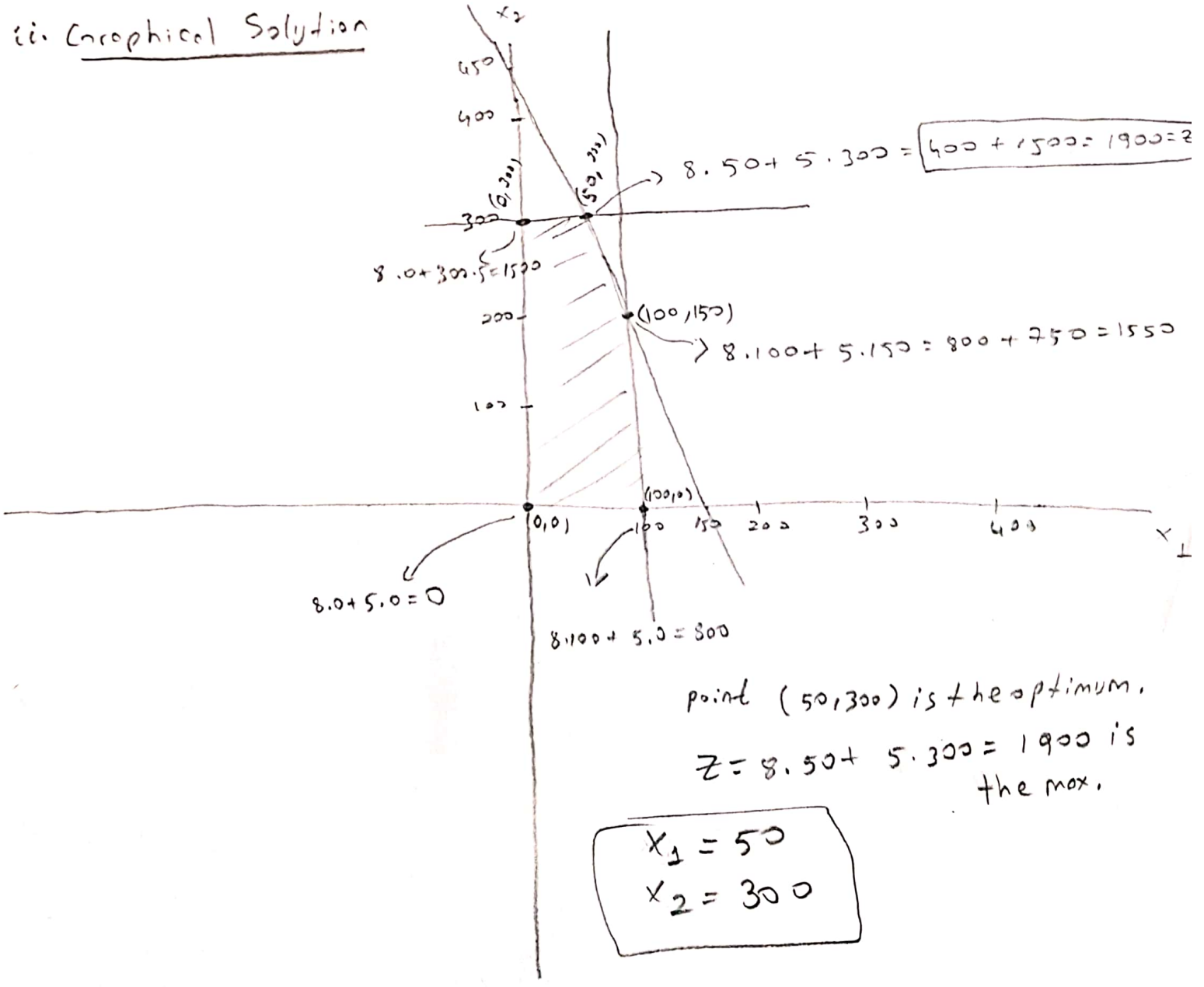
$3x_1 + x_2 \leq 450$

$x_1 \leq 100$

$x_2 \leq 300$

$x_1, x_2 \in \mathbb{R}$

ii. Graphical Solution



point (50, 300) is the optimum.

$Z = 8.50 + 5.300 = 1900$ is the max.

$x_1 = 50$
$x_2 = 300$