IE 3035 Quiz

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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 type 2. If all available labor time is dedicated to Type 2 one, company can produce a total (450 Type 2) hats a day. Market limits for two type one (100) and (300) hats per day for T1 and T2. Profit $8 for T1, $5 for T2 hat. Determine the number of hats of each type that would maximize profit.

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

	Type 1	Type 2
Labor Time	3	1
Market Limit	100	300
Profits	8	5

i) Mathematical Model

- Decision Variables

  $x_1 \Rightarrow$ ※ hats of Type 1

  $x_2 \Rightarrow$ ※ hats of Type 2

- Objective function

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

  $(-50, 80)$

- Constraints $(50, -80)$

  $x_1, x_2 \in \mathbb{Z}^+$

  $x_1 \leq 100$

  $x_2 \leq 300$

  $(3x_1 + x_2) t = 450 t$, t: time to
  1 hat

  $3x_1 + x_2 = 450$

  $(0, 450)$

  $(150, 0)$

ii) Graphical Soln.

$x_1 \leq 100$

$\rightarrow$ Optimal Sln

$x_2 \leq 300$

$\rightarrow$ Feasible Sln

$3x_1 + x_2 = 450$

For maximize, move upward to corners

$z = 8x_1 + 5x_2$

- Points
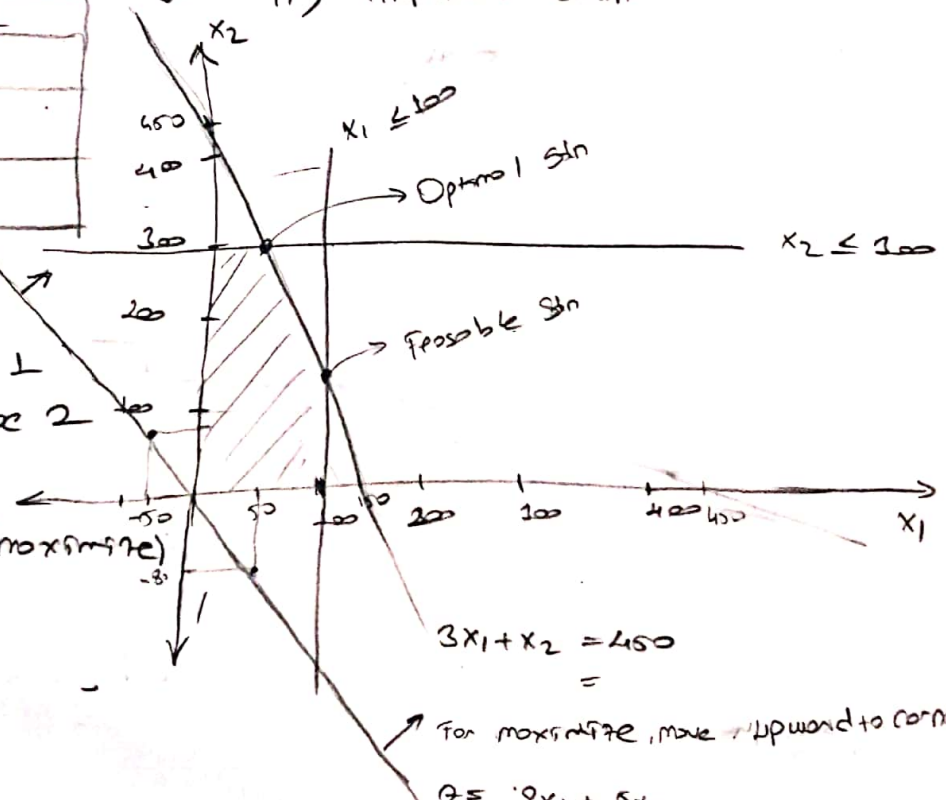
  $x_1 = 50, x_2 = 300, z = 1800$ Optimal
  $x_1 = 100, x_2 = 50, z = 1050$ feasible

- Optimal Solution on corner point

  $\Rightarrow (50, 300) \quad z = 8 \cdot 50 + 5 \cdot 300$
  $= 1800$