I am aware that any forms of cheating in this exam will result in a zero grade and a disciplinary investigation. I accept all rules and regulation regarding online exam. I give permission for the processing of my personal data as stated in the Clarification Text provided on the Faculty of Engineering website.

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Q4) Wild West produced two types of cowboy hats. A type 1 hat req. 3 times as much labour time as a type 2. If the all labour time is dedicated to Type 2 alone, company can produce a total 450 Type 2 hats in a day. The market limits are 100 and 300 hats per day respectively. The profit $8 and $5 respectively. Determine the number of hats each day that would maximize profit.

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

	Labor	Limit	Profit
Type 1	3t	100	$8
Type 2	t	300	$5

450t : total labor

i) Math. Model

Decision Variables

x_1 = Number of hats produced Type1 per day

x_2 = Number of hats produced Type2 per day.

Objective Function

maximize $Z = 8x_1 + 5x_2$

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St (constraints) :

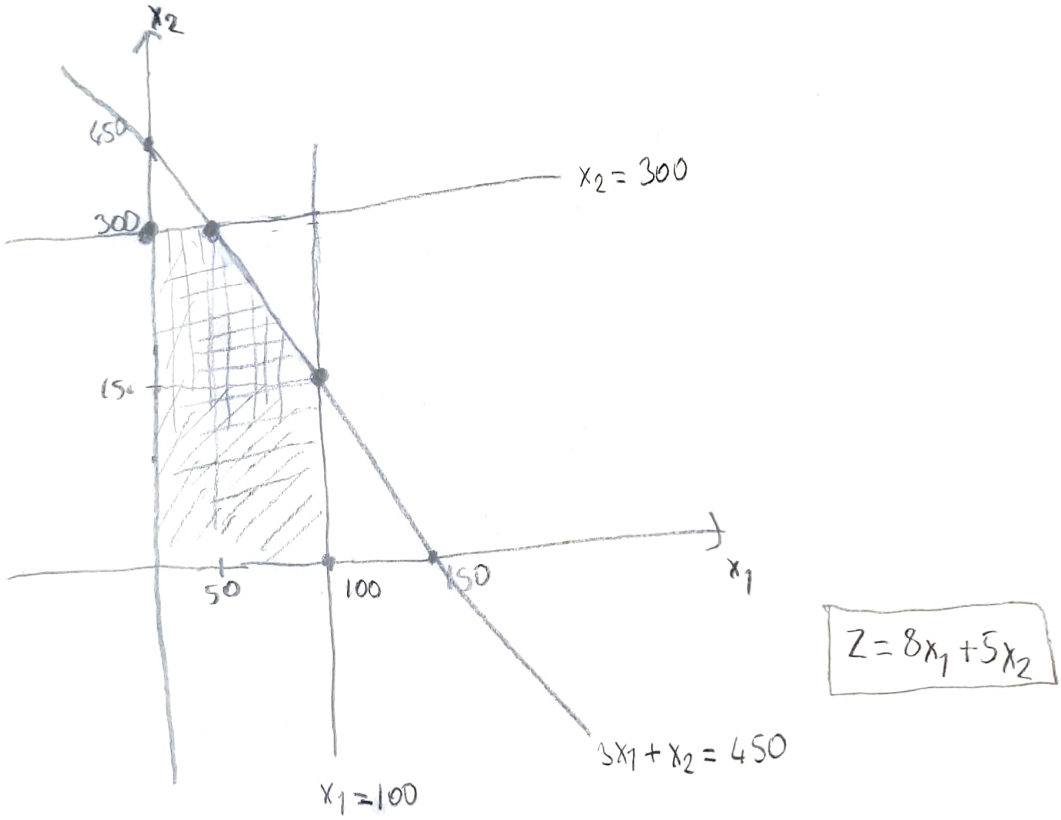
$x_1 \leq 100$

$x_2 \leq 300$

$3x_1 + x_2 \leq 450$

$x_1, x_2 \in N$

ii) Graph



$Z = 8x_1 + 5x_2$

Solution 1 => $x_1 = 50$, $x_2 = 300$, $z = 8.50 + 5.300 =$ $1900 → optimal

Solution 2 => $x_1 = 100$, $x_2 = 150$, $z = 8.100 + 5.150$

$= \$1550$ → feasible but not optimal

Solution 3 => $x_1 = 0$, $x_2 = 300$, $z = 8.0 + 5.300$

$= \$1500$ → Feasible but not optimal