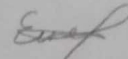I am aware that any forms of cheating in this exam will result in a zero grade and a disciplinary investigation. I accept all rules and regulations regarding online exams. I give permission for the processing of my personal data as stated in the Clarification Text provided on the Faculty of Engineering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

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① Wild 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 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.

　　ⓘ Build the mathematical model of the problem.

　　ⓘ Solve the problem graphically.

	labor time	market limit	profit ($)	full time
Type 1 hat	$3t$	100	8	150
Type 2 hat	t	300	5	(450)

ⓘ

$t \cdot 450 = 3t \cdot p$
$p = 150$

Variables : t: total labor time
　　　　　$h_1 =$ amount of h_1 produced
　　　　　$h_2 =$ amount of h_2 produced.

goal: maximize profit.
　　profit $= h_1 \cdot 8 + h_2 \cdot 5$

constraints = $\quad h_1 \leq 100$
　　　　　　　$h_2 \leq 300$
　　　　　　　$t, h_1, h_2 > 0$
　　　　　　　$3h_1 + h_2 = 450 \longrightarrow$ full time labor. $\left(\begin{array}{ccc} \text{labor time} & t & 3t \\ \text{produced amount} & 3x & x \end{array}\right)$

(ii)

$Z = 8h_1 + 5h_2$

$3h_1 + h_2 = 450$ ← full time

① feasible → $h_1 = 100$ → $h_2 = 150$
② feasible · $h_1 = 50$ $h_2 = 300$
③ feasible $h_1 = 0$, $h_2 = 300$

① → $8 \cdot 100 + 5 \cdot 150 = 1550$
② → $8 \cdot 50 + 5 \cdot 300 = 1900$
③ → $8 \cdot 0 + 5 \cdot 300 = 1500$

$Z = 8 \cdot h_1 + 5 \cdot h_2$, $h_1 = 50$ maximizes.
$h_2 = 300$