IE303S Quiz 1 — 26. April 2023

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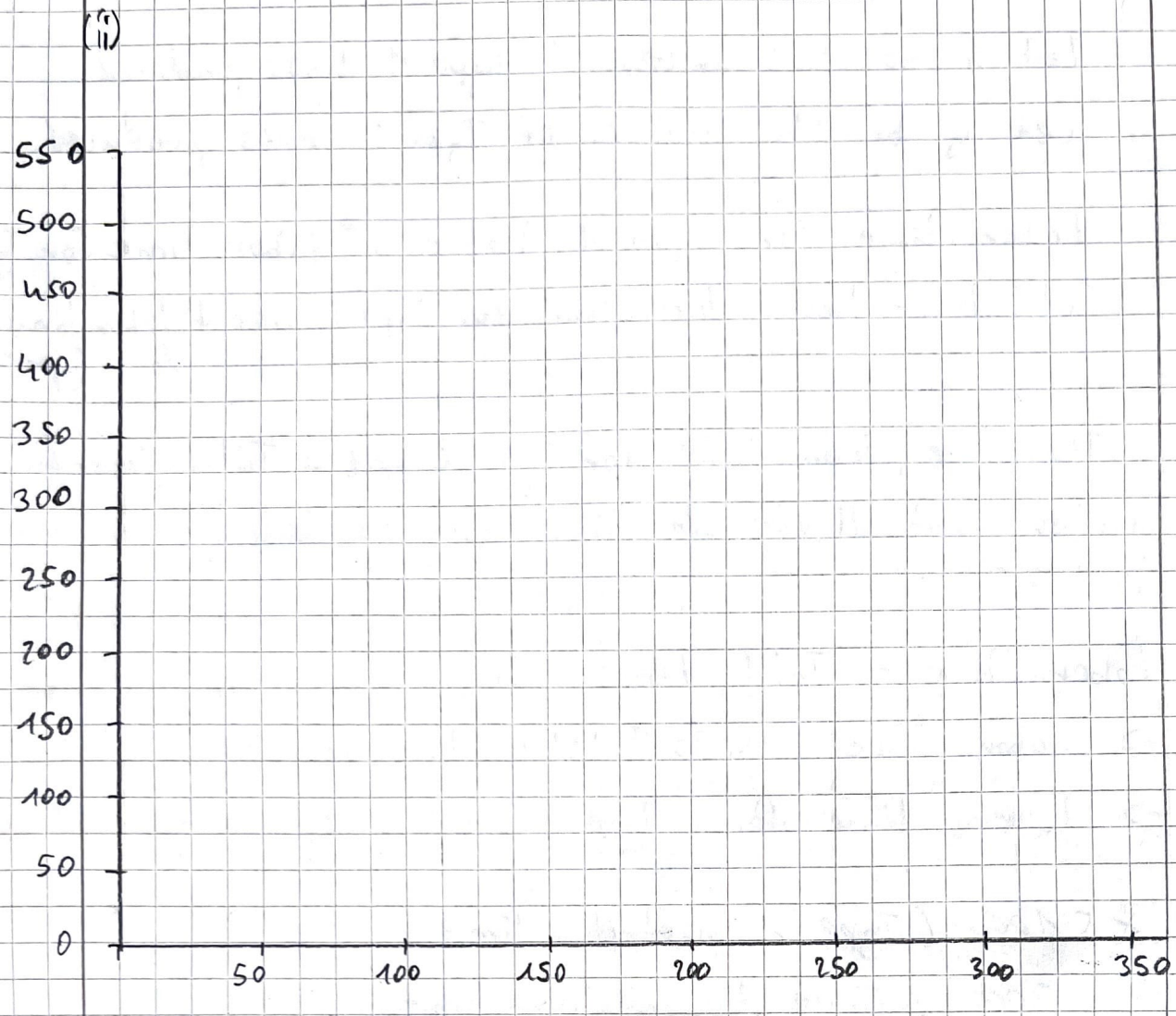
1. Wild West produces two types of cowboy hats. A type 1 hat requires three times as much labor time as a type 2. If the all available labor time is dedicated to Type2 alone, the company can produce a total of 450 Type 2 hats a day. The market limits for the two types are 100 and 300 hats per day for Type1 and Type2, 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.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Formulation

(i)

Let x be the number of Type 1 hats produced.

Let y be the number of Type 2 hats produced.

Labor time for Type 1 hat = 3 * labor time for Type 2 hat

Total labor time = labor time for Type 1 hat + labor time for Type 2 hat.

Therefore, labor time for Type 2 hat = Total labor time / 4

Given that all available labor time is dedicated to Type 2 production:

Labor time = Total labor time

→ Labor time = 450 * labor time for Type 2 hat

→ Labor time for Type 2 hat = labor time / 450

$x \leq 100$ (Type 1 production limit)

$y \leq 300$ (Type 2 production limit)

Profit function: $8x + 5y$

Labor time type 2