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①

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Q1) Wilson West produces two types of 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 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 2 respectively. The profit \$8 per Type 1 and \$5 per Type 2. Determine the num of hats of each type hat would max. profit.

- i) Build math. model of the prob.
- ii) solve graphically.

②

Answer

i)

$$x_1 = \text{Type 1}, \quad x_2 = \text{Type 2}$$

constraints;

$$3x_1 + x_2 \leq 450 \quad \{ \text{Type 1 requires 3 times as much labor} \}$$

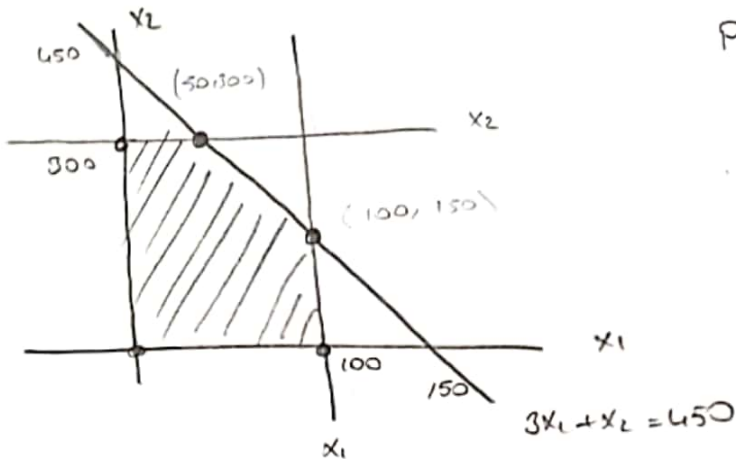
$$x_1 \leq 100 \quad \{ \text{limit 100 Type 1} \}$$

$$x_2 \leq 300 \quad \{ \text{limit 300 Type 2} \}$$

objective;

$$\max z = 8x_1 + 5x_2$$

ii)



points:

$$1) (0, 300) \rightarrow z = 8(0) + 5(300) = 1500$$

$$2) (50, 300) \rightarrow z = 8(50) + 5(300) = 1900$$

$$3) (100, 0) \rightarrow z = 8(100) = 800$$

$$4) (100, 150) \rightarrow z = 8(100) + 5(150) = 1550$$

$$5) (0, 0) \rightarrow z = 0$$

So, to maximize the profit, There must be 50 number of Type 1 hat and 300 number of Type 2 hat.

Profit will be 1900.