Model for the first example

Exercise

We assume that there are n type of possible products to produce, and b hours for the production. For every products the profit per unit, the maximum quantity to produce and how much product we produce in an hour is given. Maximize the profit!

What is the mathematical model?

Variables: $x_i, i = 1, \ldots, n$ the amount of product i to be produced

Objective: Maximize profit: p_i profit/unit of prod. i: $\sum_{i=1}^{n} p_i x_i$

Constraints: Maximum quantity m_i given: $x_i \leq m_i, \ \forall \ i$

Number of prod i in one hour h_i given: $\frac{1}{h_i}$ gives the fraction of an hour needed for 1 prod.i. Thus, in b hour $\sum_{i=1}^{n} \frac{x_i}{h_i} \leq b$ products can be produced

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$$
\max \sum_{i=1}^{n} p_i x_i
$$
$$
\text{s.t.} \ \sum_{i=1}^{n} \frac{x_i}{h_i} \leq b
$$
$$
0 \leq x_i \leq m_i, \ \forall \ i \in \{1, \ldots, n\}
$$