Stationery budget

Difficulty level: intermediate

Keywords

- Knapsack
- Integer Programming
- Linear Programming
- Binary tree
- Simplex method
- Excel Solver

Problem description

The secretary office of Iseo Municipality has to stock up on stationery: the possible items and their quantities are indicated in Table 1, together with their related unit costs. They can either purchase all the needed quantity of a given item or none at all. By taking into account that the available budget is 500 €, the secretary office wants to purchase as many different types of products as possible.

Product	**Quantity**	**Unit cost (€)**
Pencil	300	0.50
Pen	200	0.60
Rubber	150	0.50
Ruler	100	1.50
Stack of paper	80	3.90
Printer toner	12	14.90

Table 1: Items that can be purchased by the Iseo municipality secretary, together their related quantities and unit costs (in €).

Tasks

1. Find an optimal solution of the problem with the same technique used for the `Netflix` problem (e.g, buying all the 300 pencils required or not even one).
2. Formulate a mathematical model of the problem by identifying the variables, the constraints, and the objective function.

3. Formulate another mathematical model by interpreting the quantity of an item as the maximum number available and by spending as much budget as possible.