A financial company is hiring

Difficulty level: advanced

Keywords

- Assignment
- Integer Programming
- Excel Solver
- Python+PuLP

Problem description

A finance company must decide who to hire from among the three candidates C_1, C_2, and C_3. Based on their different curricula, the company knows that, in case of hiring, it will have to ensure them a fixed-monthly salary of 1450, 1600, and 1300 euro, respectively. In the current month, the company needs to complete three jobs (i.e., LAV_1, LAV_2, and LAV_3), that require different skills and experience. The LAV_1 job must be assigned with two people, whereas both LAV_2 and LAV_3 require 1 person each. Moreover, according to the assignment of the jobs to the candidates, the company will have to give some bonuses to each hired employee. An estimate of these bonuses (in euro), for all candidates and all jobs, is shown in Table 1:

Bonus (€)	LAV_1	LAV_2	LAV_3
C_1	150	230	110
C_2	100	90	150
C_3	350	410	210

Table 1: Estimate of bonuses for all candidates and all jobs.

Tasks

1. Formulate the problem by applying Linear Programming and solve it by using Excel Solver, to decide which candidates to hire, in order to minimize the total costs of the company in the current month.

2. Implement the mathematical model in Python and solve it by exploiting the PuLP library.

3. Formulate another model (or modify the previous one) that still minimizes the total costs but also takes into account that:

   - the company does not want to spend more than 3000 euro on salaries;

- the company has set a maximum cost of 1000 euro for the bonus, that also includes any unspent amount on salaries.