

At a shoe company, four jobs need to be carried out. Two of the shoe company's employees are assigned to complete these jobs. For the moment, assume each of the two employees carries out one of the four jobs individually. The time (in minutes) it takes each employee to complete each given job is shown in the table below.

| | Job 1 | Job 2 | Job 3 | Job 4 |
|------------|-------|-------|-------|-------|
| Employee 1 | 49 | 31 | 72 | 43 |
| Employee 2 | 45 | 29 | 78 | 36 |

The jobs should be distributed among the two employees such that the total number of minutes worked on the jobs is minimized.

- (a) Formulate an assignment problem to find the optimal assignment of jobs to the two employees. (Set up the problem that can be used to determine which two jobs will be assigned to them.)
- (b) Find a feasible solution to the problem. Explain how you arrived at your answer.
- (c) Check if the solution you provided in answer to (b) is optimal.
- (d) In the following, assume that each of the two employees carries out two of the four jobs individually. Can this be formulated as a transportation problem? Explain your answer.
- (e) Solve the problem in (d) using paper and pencil, employing the Hungarian method.
- (f) State the problem in (d) as an LP (write down the objective, constraints, and sign restrictions).
- (g) Solve that LP problem with the aid of a computer.
- (h) How sensitive are the results with regards to a change in an objective function coefficient?