

2E Linear Programming

Decision variables (binary coding):

Presenting an allocation problem as a linear programming problem:

1. Four workers Amy, Bob, Chris and Dave are to be assigned to tasks 1, 2, 3 and 4. Each worker is assigned to just one task and each task is to be completed by one worker. The time, in minutes, taken by each worker to complete each task is shown in the table. The total time taken is to be minimised.

	Task 1	Task 2	Task 3	Task 4
Amy	14	17	21	25
Bob	18	15	19	22
Chris	16	14	17	28
Dave	20	18	20	24

Formulate this as a linear programming problem.

2. The table shows the time, in minutes, taken for four workers A, B, C and D to do each of three tasks P, Q and R. Each worker can only be assigned one task, and each task is to be completed by one worker. Worker B cannot be assigned to task R and worker D cannot be assigned to task Q.

	P	Q	R
A	10	14	20
B	12	14	-
C	11	16	22
D	13	-	21

Formulate the problem as a linear programming problem, defining your variables and making the objective and constraints clear.

Maximisation problems:

3. Four machines 1, 2, 3 and 4 are to be used to perform four tasks A, B, C and D. Each machine is to be assigned to just one task and each task must be assigned to just one machine. The profit generated when each machine performs each task is given in the table. The company wishes to maximise the total profit.

	A	B	C	D
1	10	2	8	6
2	9	3	11	3
3	3	1	4	2
4	3	2	1	5

Formulate the above assignment problem as a linear programming problem, defining your variables and making the objective and constraints clear.

