Exercise 1

Define an algorithm in Matlab for the following scheduling problem. It is suggested to apply different approaches based on Johnson algorithm, for example grouping M1 and M2 as one virtual machine MA and similarly M3 and M4 as MB. Verify other configurations (for example grouping M1, M2, and M3 as MA, and M4 as MB). The processing time of a virtual machine for one job is given by the sum of the processing of the real machines.

Schedule the following *n* jobs, where *pj* is the processing time on machine i. The goal is to minimize Cmax.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Job | J1 | J2 | J3 | J4 | J5 | J6 | J7 | J8 | J9 | J10 |
| *P1* | 5 | 3 | 6 | 8 | 4 | 12 | 12 | 5 | 3 | 2 |
| *P2* | 12 | 6 | 1 | 5 | 6 | 15 | 3 | 2 | 8 | 8 |
| *P3* | 1 | 20 | 2 | 5 | 7 | 11 | 12 | 2 | 5 | 4 |
| *P4* | 13 | 10 | 1 | 15 | 6 | 12 | 11 | 4 | 4 | 13 |

Verify that the solution that has been obtained is optimal or not comparing with the solution obtained in a mathematical programming problem defined in Excel (or other spreadsheet tool with optimization module) or Lingo or Cplex.