

Homework 3

1. Consider the following instance of $Jm || C_{max}$

| jobs | machine sequence | processing times | | |
|------|------------------|------------------|--------------|--------------|
| 1 | 1,2,3 | $p_{11} = 9$ | $p_{21} = 8$ | $p_{31} = 4$ |
| 2 | 1,2,4 | $p_{12} = 5$ | $p_{22} = 6$ | $p_{42} = 3$ |
| 3 | 3,1,2 | $p_{33} = 10$ | $p_{13} = 4$ | $p_{23} = 9$ |

Give the disjunctive programming formulation of this instance.

2. Consider the instance in problem 1. Apply the Shifting Bottleneck heuristic to this instance.

3. Consider $P6 || C_{max}$ with the following data

| jobs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|-------|---|---|---|---|---|---|---|---|---|----|----|----|----|
| p_j | 6 | 6 | 6 | 7 | 7 | 8 | 8 | 9 | 9 | 10 | 10 | 11 | 11 |

- a) Compute the makespan under SPT.
b) Find an optimal schedule and the corresponding makespan.

4. Consider $F2 | nwt | C_{max}$ with 4 jobs.

| jobs | 1 | 2 | 3 | 4 |
|-----------|----|---|---|----|
| $p_{1,j}$ | 2 | 5 | 5 | 11 |
| $p_{2,j}$ | 10 | 6 | 6 | 4 |

- a) Formulate the equivalent asymmetric TSP problem, solve it using some heuristic (if needed) and find the corresponding job sequence and makespan.
b) Find the optimal sequence and makespan when there is an unlimited intermediate storage.