

**IE424 Homework I**  
**Work individually**  
**Due date: Nov. 8, 2023- 23:59 hrs**  
**Submit your report as an Assignment to ODTUClass**

Consider the following data for a 20 job single machine scheduling problem:

job (j)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Proc. Time	171	105	65	85	85	198	80	64	97	116	115	69	90	177	143	65	166	200	118	126
due date	1525	1015	1094	1301	600	1538	1540	652	655	476	643	1242	578	1051	1484	840	919	814	1109	1341
weight	7	5	3	8	8	3	10	9	9	4	2	4	3	3	3	2	4	7	4	9

Consider the following performance measures:

- a) Minimize Total Tardiness
- b) Minimize Total Weighted Tardiness
- c) Minimize Total Number of Tardy Jobs
- d) Minimize Total Weighted Number of Tardy Jobs
- e) Minimize Maximum Tardiness
- f) Minimize Maximum Weighted Tardiness

Formulate a suitable model(s) and by using a Mathematical Programming package solve the problems with the following objectives.  
 Report the solution you obtain and also report the value of the other performance measures:

- i) Total Tardiness
- ii) Total Weighted Tardiness
- iii) Total Number of Tardy Jobs
- iv) Total Weighted Number of Tardy Jobs
- v) Maximum Tardiness
- vi) Maximum Weighted Tardiness

Also find a feasible schedule by the EDD rule and evaluate this solution for each above performance measure.

You may summarize your results in the following table:

Objective/Measure	i	ii	iii	iv	v	vi
a						
b						
c						
d						
e						
f						
EDD solution						

For each case above also report the following:

1. LP relaxation objective function value and solution effort (CPU times, number of iterations/branches etc.)
2. IP objective function value and solution effort (CPU times, number of iterations/branches etc.)

What would be your suggestion for the schedule to implement? (explain)

Notes:

1. It is important that the models you develop are efficient such that the solution(s) could be obtained with reasonable amount of CPU time; Therefore you may use different models for different objectives.
2. Reporting is essential part of your work such that the results obtained could be clearly understood and appreciated by the reader.
3. The main part of your report should include your model(s), summary of the results and discussion. You may deliver details in Appendices.