HW 8 - Solution

1.a. FCFS

Sequence	Completion Time	Flow Time	Tardiness
1	1:20	20	0
2	1:34	34	0
3	2:09	69	19
4	2:19	79	49
	Total	202	68

Mean flow time = 202/4 = 50.5
Average tardiness = 68/4 = 17
Number of tardy trucks = 2

SPT

Truck	Completion Time	Flow Time	Tardiness
4	1:10	10	0
2	1:24	24	0
1	1:44	44	19
3	2:19	79	29
	Total	157	48

Mean flow time = 157/4 = 39.25
Average tardiness = 48/4 = 12
Number of tardy trucks = 2

EDD

Truck	Unloading Time	Completion Time	Flow Time	Tardiness
1	20	1:20	20	0
4	10	1:30	30	0
2	14	1:44	44	0
3	35	2:19	79	29
		Total	173	29

Mean flow time = 173/4 = 43.25
Average tardiness = 29/4 = 7.25
Number of tardy trucks = 1

CR

Time: 1:00 p.m:

Truck	Unloading Time	Due Time	CR
1	20	25	25/20 = 1.25*
2	14	45	45/14 = 3.21
3	35	50	50/35 = 1.43
4	10	30	30/10 = 3.0

Time: 1:20 p.m:

Truck	CR
2	25/14 = 1.79
3	35/30 = 1.17*
4	10/10 = 1

Time: 1:55 p.m:

Truck	CR
2	-10/14 <0
4	-25/10 <0

1-3-4-2

Summary for the results for the CR Scheduling

Truck	Unloading Time	Completion Time	Flow Time	Tardiness
1	20	1:20	20	0
3	35	1:55	55	5
4	10	2:05	65	35
2	14	2:19	79	34
		Totals	219	74

Mean flow time = 219/4 = 54.75
Average tardiness = 74/4 = 18.5
Number of tardy trucks = 3

1.b SPT minimizes mean flow time. The SPT sequence is 4-2-1-3.

EDD minimizes maximum lateness. The EDD sequence is 1-4-2-3.

To minimize number of tardy jobs, Start with EDD solution:

Truck	Time	Tardiness
1	20	0
4	10	0
2	14	0
3	35	29

The method calls for rejecting the job with the longest processing time and placing it at the end of the sequence. Since job 3 already has the longest time, the EDD sequence is the final solution.

2. Lawler's Algorithm

$\gamma = 19$

1. Find job scheduled 8th. Candidates are 3, 8, 5.
   min[19-13, 19-19, 19-12] = 0 at job 8.

2. Find job scheduled 7th. Candidates are 3, 5, 7.
   $\gamma = 19 - 2 = 17$.
   min[17-13, 17-12, 17-15] = 2 at job 7.

3. Find job scheduled 6th. Candidates are 3, 4, 5.
   $\gamma = 17 - 2 = 15$.
   min[15-13, 15-6, 15-12] = 2 at job 3.

4. Find job scheduled 5th. Candidates are 4, 5, 6.
   $\gamma = 15 - 2 = 13$
   min[13-6, 13-12, 13-10] = 1 at job 5.

5. Find job scheduled 4th. Candidates are 4, 6
   $\gamma = 13 - 4 = 9$
   min[9-6, 9-10] = -1 at job 6.

6. Find job scheduled 3rd. Candidates are 2, 4
   $\gamma = 9 - 3 = 6$.
   min[6-4, 6-6] = 0 at job 4.

7. Find job scheduled 2nd. Candidates are 1, 2.
   $\gamma = 6 - 1 = 5$
   min[5-5, 5-4] = 0 at job 1.

8. Finally job 2 must be scheduled first. The optimal sequence is, therefore:

   2-1-4-6-5-3-7-8.