Homework 2

1. Consider the $1 \,|\, chain \,|\, \sum w_j C_j$ problem with the following data

jobs	1	2	3	4	5	6	7
w_j	0	18	12	8	8	17	16
p_j	3	6	6	5	4	8	9

The jobs are subject to precedence constraints which take the form of chains:

$$1 \to 2$$

$$3 \to 4 \to 5$$

$$6 \to 7$$

Find all optimal sequences.

2. Find all optimal sequences for the instance of $1 \,|\, prec \,|\, h_{max}$ with the following jobs

jobs	1	2	3	4	5	6	7
p_j	4	8	12	7	6	9	9
$h_j(C_j)$	$3C_1$	77	C_3^2	$1.5C_4$	$70 + \sqrt{C_5}$	$1.6C_6$	$1.4C_7$

subject to the following precedence constraints

$$5 \to 7$$

$$1 \to 7 \to 6$$

$$5 \to 4$$

3. Solve by branch-and-bound the following instance of the $1 \,|\, r_j, prec \,|\, L_{max}$ problem

jobs	1	2	3	4	5	6	7
p_j	6	8	12	10	10	17	16
r_j	0	0	0	14	25	25	50
d_j	8	42	44	24	90	85	68

subject to the following precedence constraints

$$2 \to 1 \to 4$$

$$6 \to 7$$

4. Use the ATC dispatching rule to find a solution for the following instance of the $1 \,||\, \sum w_j T_j$ problem.

jobs	1	2	3	4	5	6	7
p_j	6	8	12	10	10	17	16
w_j	1	5	2	4	1	4	2
d_j	8	42	44	24	90	85	68

5. Use the backward-forward heuristic to find a solution to the following instance of the $1 \mid\mid \sum T_j$ problem.

jobs	1	2	3	4	5
p_j	4	3	2	2	5
d_j	2	3	6	10	12