Assignment 3

Posted on April 5, due on April 19

- Maximum total is 40 points. Each problem is worth 10 points.

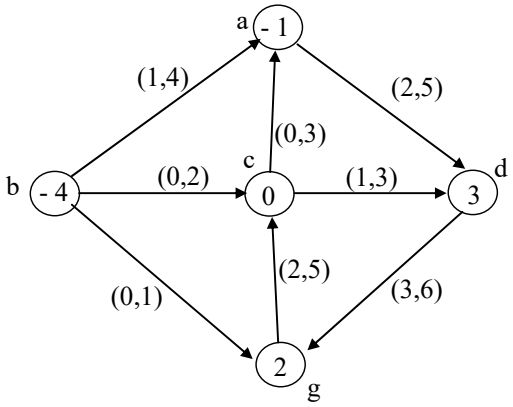
Problem 1.

We solved in class the "Weighted Interval Scheduling" problem using dynamic programming (see PPT presentation on Dynamic Programming). Let us assume that the n requests have start times s[1..n] and finish times f[1..n]. Assume that $f[1] \leq f[2] \leq f[3] \leq \ldots \leq f[n]$.

Use pseudocode to write an algorithm which computes the values p(i) for each request i. The output of your algorithm is an array p[1..n] containing p(i) value for each request i. What is the RT of your algorithm, as a function of n?

Problem 2. (Circulation with demands and lower bounds)

Find whether there is a feasible circulation for the flow-network below. Show your work for full credit, similar to the example done in class.



Problem 3. Greedy Algorithms

Let us consider a system of coins with n denominations $\{c_1, c_2, \ldots, c_n\}$ such that $c_i \geq 2c_{i-1}$ for i = 2, 3, .., n. Does the greedy algorithm optimally solve the change-making problem for this system of coins? Either prove that greedy always yields an optimal solution or give an example for which greedy does not compute the optimal solution.

(*continued next page*)

Problem 4 (Dynamic Programming)

What is an optimal alignment for MOAT and BOAST ?

Assume that $\delta = 3$ and consider the following matching/mismatching costs:

	A	B	M	O	S	T
A	0	1	2	3	2	3
B		0	4	3	1	4
M			0	5	1	3
O				0	4	3
S					0	2
T						0

Fill out the table A and write the optimal alignment obtained.