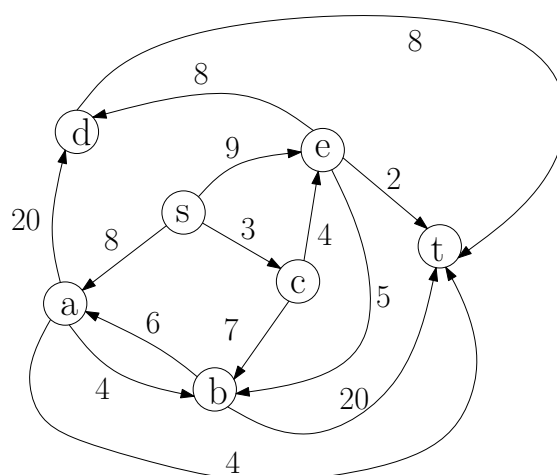


CSIT 5500 Advanced Algorithms
2020 Spring Semester
Written Assignment 4
Handed out: April 20, 2020
Due: 21:00 on May 4, 2020

Please submit a soft copy via the canvas system by the due date and time shown above. Late assignments will not be graded.

- (10 points) Run Ford-Fulkerson's maximum flow algorithm on the following directed graph G . Use s as the source and t as the sink. Use the same convention and notation as in the lecture notes to show:

- The residual graph G_f and the augmenting path selected in G_f .
- The flow values on the edges of G and G_f after using the augmenting path selected to update the flow.



- (10 points) Run the stable marriage algorithm as described in class on the following set of people and jobs. Each person has a priority list of jobs, and there is also a priority list of the people for each job. As in the lecture notes, the priority decreases from left to right in the two tables below.

People	Jobs				
p_1	j_1	j_2	j_4	j_3	
p_2	j_1	j_4	j_3	j_2	
p_3	j_1	j_3	j_4	j_2	
p_4	j_3	j_4	j_2	j_1	

Jobs	People			
j_1	p_4	p_1	p_2	p_3
j_2	p_4	p_1	p_3	p_2
j_3	p_3	p_1	p_2	p_4
j_4	p_1	p_3	p_4	p_2

Show the intermediate results of your run as in the lecture notes.

- (10 points) This question is about the Misra-Gries algorithm. The elements in the stream come from the range $[1, 8]$. Use $k = 5$. Run the Misra-Gries algorithm on the following stream (in left-to-right order).

7, 3, 1, 1, 5, 2, 7, 5, 3, 5, 8, 1, 5, 4, 4, 2, 1, 6, 8, 7, 6, 8, 7, 5, 7, 2, 5, 4, 5, 8, 4, 5, 1, 1, 5, 2, 7, 1, 2, 1, 3, 4

- (a) Draw the table A and show its current content (including the elements in the table and their counts) after seeing each element in the stream.
- (b) Draw a table that shows the true frequencies and estimated frequencies (according to the Misra-Gries algorithm) of the values in the range $[1,8]$. Your table should be updated after seeing each element in the stream.