CS 300

Data Structures

Assigned: Dec 21, 2018, Due: Dec 28, 2018 at 23:55

- NO SUBMISSIONS OUTSIDE SUCOURSE WILL BE ACCEPTED.
- **SOLUTIONS HAVE TO BE YOUR OWN. NO COLLABORATION OR COOPERATION AMONG STUDENTS IS PERMITTED.**
- Please provide only the requested information and nothing more. The solution papers should be typeset using Word, ScientificWorkplace, LATEX, etc., and any figures should be drawn using some kind of a drawing tool such as PowerPoint, Visio, etc. HOWEVER YOUR SOLUTIONS SHOULD BE SUBMITTED IN ONLY .pdf FORMAT. NO HAND-WRITTEN SOLUTIONS WILL BE ACCEPTED. Make sure what is submitted can be properly printed, otherwise they will not be considered.
- You should name your homework as XXXXX-NameLastname.pdf where XXXXX is your student number (possibly with a leading 0). Make sure you do NOT use any Turkish characters in the file/folder name.
- **Late submissions will be penalized 10% of the full grade per late day (or portion of a late day). Submissions that are late BY MORE THAN ONE DAY will not get any credits.**

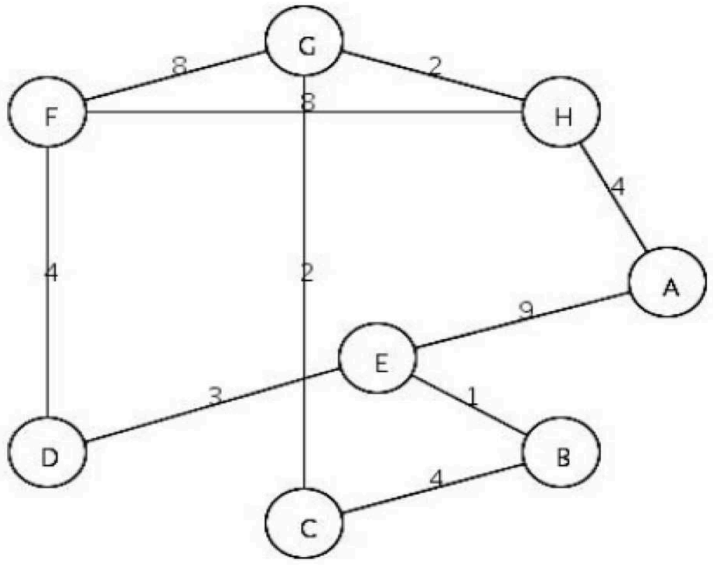

Figure 1: A directed weighted graph.

Question 1 (20 points)

Starting from G, trace the operations of the Dijkstra's *weighted* shortest path algorithm on the graph given in Figure 1.

Question 2 (15 points)

Starting from G, trace the operations of the Prim's minimum spanning tree algorithm on the graph given in Figure 1.

Question 3 (15 points)

Trace the operations of Kruskal's minimum spanning tree algorithm on the graph given in Figure 1.

Question 4 (15 points)

Starting from S, trace the operations of breadth-first traversal on the graph given in Figure 2.

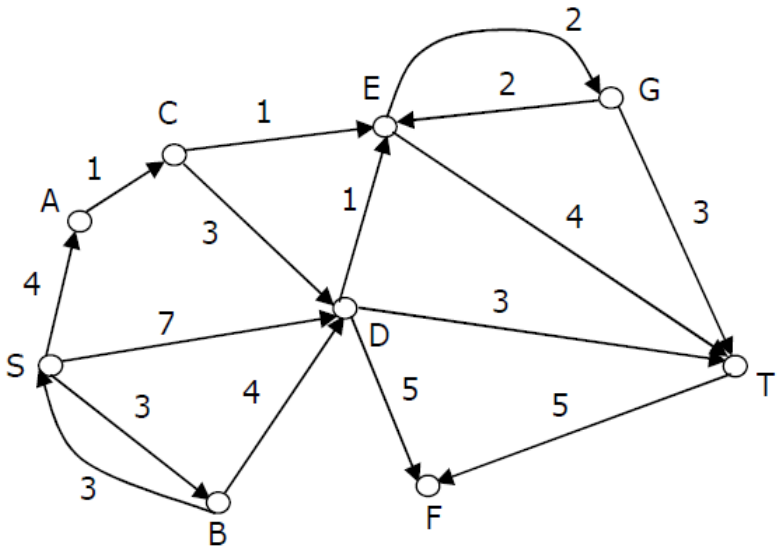

Figure 2: A directed weighted graph.

Question 5 (20 points)

Given Figure 2 and starting from S,

a) Trace the operations of depth-first traversal.

b) Give the post-order numbers for all the nodes.

c) Give the pre-order numbers for all the nodes.

d) List the tree arcs, cross arcs, forward arcs, and backward arcs.

Question 6 (15 points)

Find a topological ordering of the graph given in Figure 3.

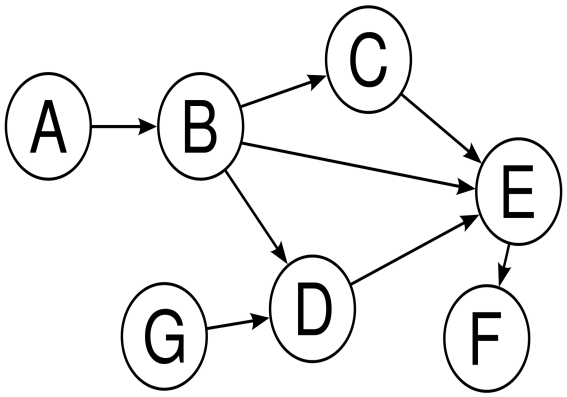

Figure 3: An example DAG.