CS 300
Data Structures

Homework 5

Assigned: Dec 22, 2021, Due: Dec 31, 2021 at 11:55pm

- 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-hw5.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 1 day will not get any credits.**

Question 1 (20 points)

Trace the operation of Dijkstra's *weighted* shortest path algorithm for the following graph. Use vertex E as your start vertex.

Question 2 (20 points)

Trace the operation of Prim's minimum spanning tree algorithm for the graph in Figure 1. Use vertex E as your start vertex.

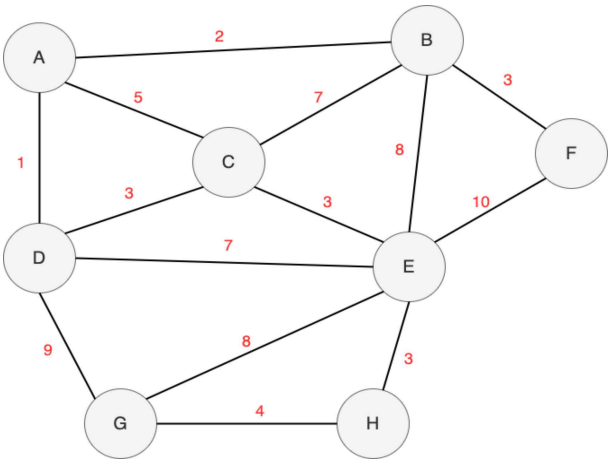

Figure 1: An undirected weighted graph.

Question 3 (20 points)

Trace the operation of Kruskal's minimum spanning tree algorithm for the graph in Figure 1.

Question 4 (20 points)

Find shortest *unweighted* path from G to all other vertices for the graph in Figure 1. Use breadth-first search algorithm in your answer. Do NOT forget to show the trace.

Question 5 (20 points)

Find a topological ordering of the graph in Figure 2.

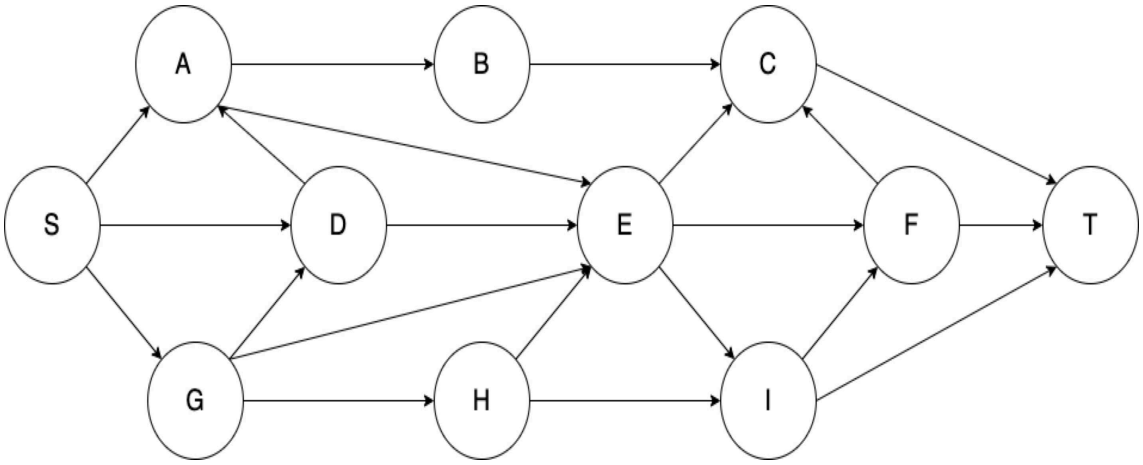

Figure 2: A directed acyclic graph.