Reminder

Final Exam will be held at 5:00 pm on Monday, May 9 in ATC 1.305. There will be a review class on Wed. April 27, which will be the last class of this course in semester.

Homework Assignment #6 (Due Date: Wed., April 27)

Do the following problems:

1. Find a topological sort for the graph shown in Fig. 1.

![Figure 1: Graph](image)

2. Find the single-source shortest path solution from s to all other vertices in Fig. 2. Show each step as in Fig. 9.28 in the textbook (or Lecture notes page 7-13).

3. Find the minimum spanning tree using Prim's algorithm for the graph shown in Fig. 3. Show each step as in Fig. 9.51 in the textbook (or Lecture notes page 7-25).
(4) Find the minimum spanning tree using Kruskal’s algorithm for the graph shown in Fig. 3. Show each step as in Fig. 9.59 in the textbook (or Lecture notes page 7-27).

(5) Produce a depth-first spanning tree for the graph in Fig. 4. Show as in Fig. 9.65 in the textbook (or Lecture notes page 7-32) the $\text{Num}(v)$ and $\text{Low}(v)$ for each vertex and identify all articulation points.

(6) Does the graph in Fig. 4 have an Euler Path or Euler Circuit? If it does, give the sequence of letters for it.

(7) For the graph shown in Fig. 5, perform depth-first search starting from vertex $a$, identify
forward edges, back edges and cross edges, and find strongly connected components.

Figure 5:

(8) Prove that a directed graph of $n$ vertices is strongly connected with minimum number of edges if and only if it is a ring. A ring of 5 vertices is shown in Fig. 6.

Figure 6:

(9) A student needs to take a certain number of courses to graduate, and these courses have prerequisites that must be followed. Assume that all courses are offered every semester and that the student can take an unlimited number of courses each semester. Describe an algorithm which for a given list of courses and their prerequisites, computes a schedule that requires the minimum number of semesters.