CS 202: Design and Analysis of Algorithms

Quiz 1

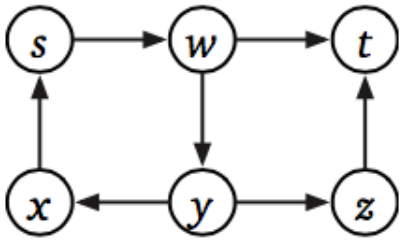
13 December 2020

1 Instructions

1. Time: 2-3 pm.
2. Maximum marks : 10
3. Write your name and roll number on the answer sheet.
4. For each question write answers on separate sheets.
5. Be honest.
6. Submit the answers through gradescope.

2 Questions

1. Consider the graph in the following figure.



   List all the strongly connected components in the graph. Explain the execution of DFS on the above graph and list tree arcs, cross arcs, backward arcs and forward arcs. For each vertex u, write $u.pre$ and $u.post$ values. [1+2+2]

2. Let G be an edge-weighted graph. Suppose, for any partition of the vertices of G into two subsets, the minimum weight edge with one endpoint in each subset is unique. Prove that G has a "unique" minimum spanning tree. [3]

3. A cut in a graph G is a partition of $V(G)$ into two non-empty parts A and B. How may cuts are there in a graph on n vertices. [2]