Cpt S 350 Homework #7

Please print your name!

1. Describe an algorithm that answers the following question:
Given: a graph $G = (V, E)$
Question: is G a DAG?
What is the wosrt case complexity of your algorithm?

2. Let G be a *decorated graph*. That is, each edge in G is labeled with a color drawn from a finite set C. Let v and v' be two given nodes in G. Design an algorithm that answers the following question: is it true that, for every path (a path could contain loops) from v to v', the number of red edges is greater than the number of green edges?

3. Let G be a *decorated graph*. That is, each edge in G is labeled with a color drawn from a finite set C. Let v and v' be two given nodes in G. Design an algorithm that answers the following question: is it true that, for every path (a path could contain loops) from v to v', the number of red edges and the number of green edges are both at least 4?

4. Let G be an *activity graph*. That is, each edge in G is labeled with an activity drawn from a finite set A. Each node in G is also called a state. Let s_0 be a given initial state. In the definition of G, each node is either marked with *good* or *not-good*. Recall that a *liveness* property is to argue that something good will eventually happen. That is, it is not true that, from s_0, there is an infinite path on G on which every state is marked with not-good. Design an algorithm to decide whether G satisfies the liveness property or not.

5. Let G be a graph where each edge is colored and multiple edges can share the same color. We are given three distinct nodes v_1, v_2 and v_3 (the graph could have many nodes). The graph is good if there is an infinite walk from v_1 that passes v_2 for only finitely many times and passes v_3 for infinitely many times and, after certain point on the walk, the walk only contains either red degs or green edges. Design an algorithm that decides whether a graph is good.