ASSIGNMENT 6: COMP2711H

FALL 2015

Q1 Show that the number of edges of a simple graph with n vertices is at most $n(n-1)/2$. (14 Marks)

Q2 Answer the following questions:

a. In a simple graph, must every vertex have degree that is less than the number of vertices in the graph? Why? (8 Marks)

b. Can there be a simple graph that has $n \geq 2$ vertices all of different degrees? (8 Marks)

Q3 Please answer Question 18 (Exercise Set 10.2) on Page 657 of the textbook by Epp. (14 Marks)

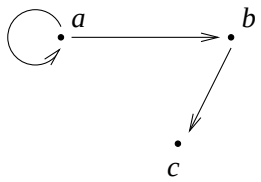
Q4 Please answer Question 23 (Exercise Set 10.2) on Page 659 of the textbook by Epp. (14 Marks)

Q5 What is the total degree of a tree with n vertices? Why? (14 Marks)

Q6 Let R be a relation on a set A. The directed graph associated with R, denoted by G_R, has A as its vertex set, and the edges of G_R are defined by

$$\text{for any } u, v \in A,\ (u, v) \in E(G_R) \text{ iff } u\ R\ v.$$

For example, let $A = \{a, b, c\}$ and $R = \{(a, a), (a, b), (b, c)\}$. Then G_R is



Let G be a digraph. G is called a directed acyclic graph (dag) iff it has no closed walks with at least two distinct vertices.

Suppose R is a partial order on a set A. Prove that its associated digraph G_R is a dag. (14 Marks)

Q7 Find 21^{-1} mod 38923, i.e., the multiplicative inverse of 21 modulo 38923. (14 Marks)

Date: Handed out on Oct. 30, due on Nov. 6 at the *beginning* of the lecture.