Practice Exam 3 Discrete Mathematics II

Name: _____ **Due Date**: 04/08

Q 1*)(i) How many nonisomorphic non rooted trees are there with 4 vertices ?*
(ii) How many nonisomorphic rooted trees are there with 4 vertices?
(iii) How many nonisomorphic **non rooted** *trees are there with 5 vertices*

Q 2*)a. How many edges does a tree with 10,000 vertices have?*

b. How many vertices does a full 5-ary tree with 100 internal vertices have?

c. How many edges does a full binary tree with 1000 internal vertices have?

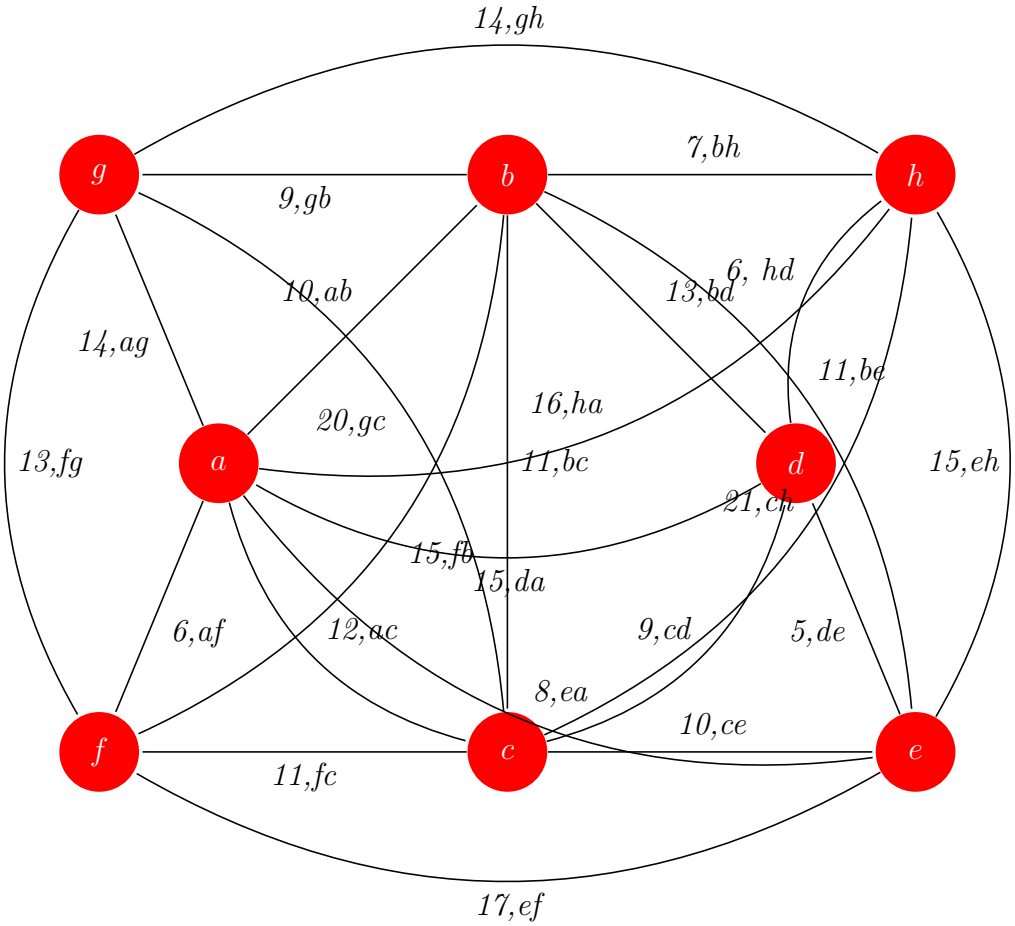
d. How many leaves does a full 3-ary tree with 100 vertices have?

Q 3*)Suppose that the address of the vertex v in the ordered rooted tree T is 3.4.5.2.4.*
a) At what level is v?
b) What is the address of the parent of v?
c) What is the least number of siblings v can have?
d) What is the smallest possible number of vertices in T if v has this address?

Q 4*)Use depth- first search to find a spanning tree of each of these graphs.*
a) W_6 *, starting at the vertex of degree 6* *b)* K_5
c) $K_{3,4}$*, starting at a vertex of degree 3* *d)* Q_3

Q 5*)Prove Kruskal's Theorem*

Q 6*)Use Prim-Jarnik's or Kruskal's algorithm to find, step by step, the minimal spanning tree from the graph below. State what method you are using.*



Q 7*)Describe the tree produced by breadth-first search and depth-first search for the n-cube graph Q_n, where n is a positive integer.*

Q 8 *Build a binary search tree for the words:* oenology, phrenology, campanology, ornithology, ichthyology, limnology, alchemy, *and* astrology *using alphabetical order.*

Q 9 *For the tree in question 8 determine the order in which a inorder traversal visits the vertices of the given ordered rooted tree.*

Q 10 *For the tree in question 8 determine the order in which a postorder traversal visits the vertices of the given ordered rooted tree.*

Q 11 *How many nonisomorphic unrooted trees are there with six vertices?*

Q 12 *How many nonisomorphic rooted trees are there with six vertices ?*