

CSCE 235: Introduction to Discrete Structures

Homework assignment 7 (115 points)

Assigned Tuesday, April 10, 2007

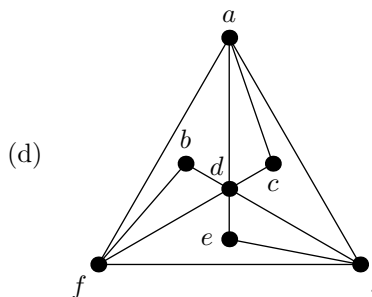
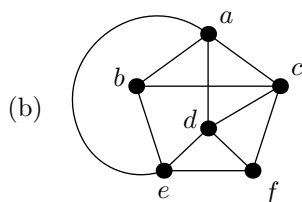
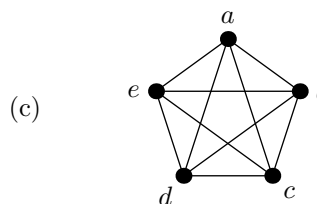
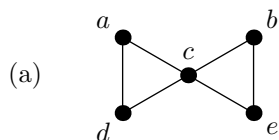
Due Wednesday, April 18, 2007

Problem 1. (18 points) Make a list of drawings of all the simple graphs with at most four vertices. The list should not contain any isomorphic pairs of graphs. (You should get a list of 18 graphs.)

Problem 2. (8 points) Draw a graph with exactly five vertices, each of degree 5, or explain why such a graph does not exist.

Problem 3. (10 points) Draw Q_4 . Is this graph bipartite?

Problem 4. (24 points) For each of the graphs below, determine whether it has an Euler circuit, and construct such a circuit if one exists. If the graph has no Euler circuit, explain why. Also determine whether the graph has a Hamiltonian circuit, and either construct such a circuit if one exists or justify your claim that there is no Hamiltonian circuit.

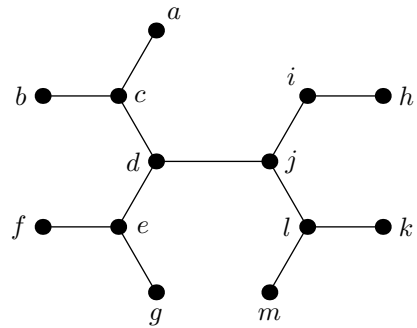


Problem 5. (12 points) In graph models of saturated hydrocarbons, each carbon atom is represented by a vertex of degree 4, and each hydrogen atom is represented by a vertex of degree 1. (See Example 5 on page 688 of the textbook.) The nonisomorphic trees with n vertices of degree 4 and $2n + 2$ vertices of degree 1 represent the different isomers of C_nH_{2n+2} . How many isomers are there of

- (a) propane (C_3H_8)?
- (b) pentane (C_5H_{12})?
- (c) hexane (C_6H_{14})?

Problem 6. (10 points) Build a binary search tree for the words in the sentence “now is the time for all good men to come to the aid of their party”, inserting the words into the tree in the order they appear in the sentence. Do not insert duplicate words more than once.

Problem 7. (21 points) Consider the following tree T .



Form an ordered rooted tree T' from T by choosing d as the root and ordering the children of each internal vertex alphabetically. Draw T' . In what order are the vertices encountered in the preorder traversal of T' ? in the inorder traversal of T' ? in the postorder traversal of T' ? Answer the same questions if j is chosen as the root, and if f is chosen as the root.

Problem 8. (12 points) Find a spanning tree for the graph shown below by beginning at a and using

- depth-first search.
- breadth-first search.

