

MATH 4/52021
EXAM II

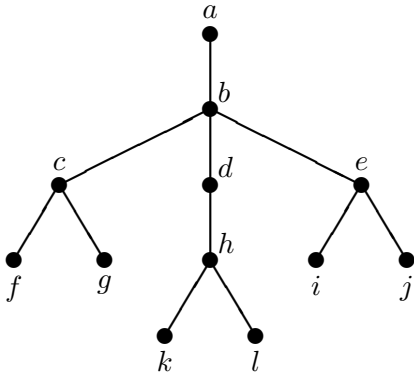
Prof. D. L. White
November 5, 2009

NAME: _____

Write clearly and *SHOW ALL WORK*. There are 10 problems, on 6 distinct pages. *Put your name on each page*. Time allowed is 1 hour and 15 minutes, the exam is worth 100 points.

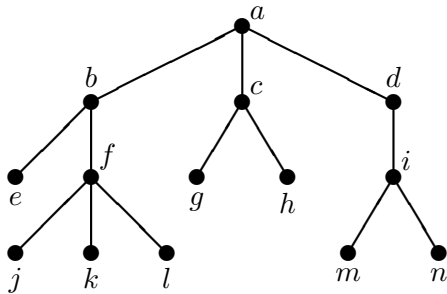
1. (10 points) For the tree below, list the following:

- (a) the root,
- (b) all leaves,
- (c) all internal vertices,
- (d) the level of each vertex,
- (e) the height of the tree.



2. (10 points) List the vertices of the tree below in order of

- (a) a preorder traversal,
- (b) a postorder traversal.

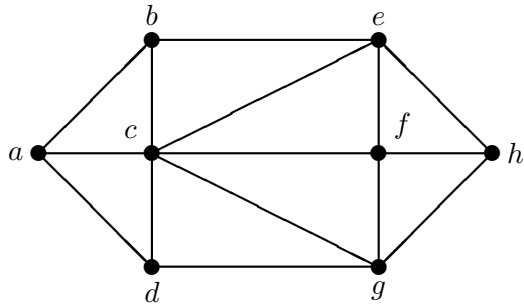


NAME: _____

3. (10 points) Find a spanning tree in the following graph

(a) by a depth-first search starting at vertex a ,

(b) by a breadth-first search starting at vertex a .

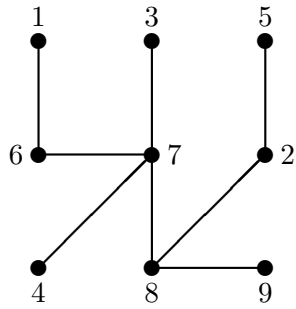


4. (10 points) Determine if the graph defined by the following adjacency matrix is connected. Justify your answer.

	x_1	x_2	x_3	x_4	x_5	x_6
x_1	0	1	1	0	0	0
x_2	1	0	1	0	1	0
x_3	1	1	0	0	1	0
x_4	0	0	0	0	1	0
x_5	0	1	1	1	0	1
x_6	0	0	0	0	1	0

NAME: _____

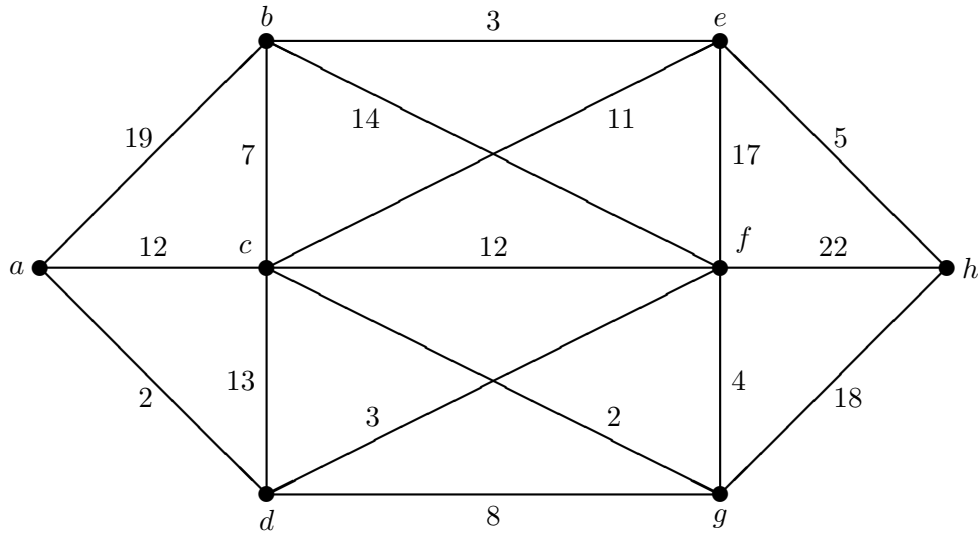
5. (8 points) Find the Prüfer sequence associated with the following labeled tree.



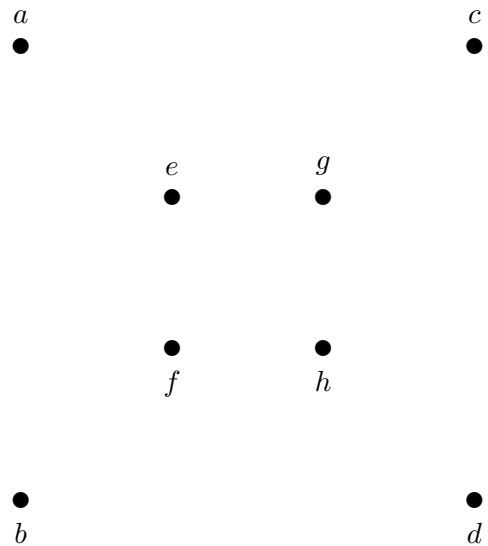
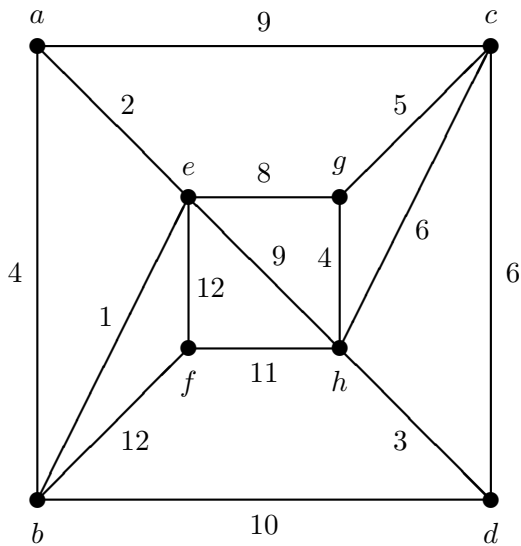
6. (8 points) Construct the labeled tree associated with the Prüfer sequence $(5, 4, 6, 3, 4, 7, 5)$.

NAME: _____

7. (10 points) Find a shortest path from a to h in the graph below. The lengths of the edges are as shown.

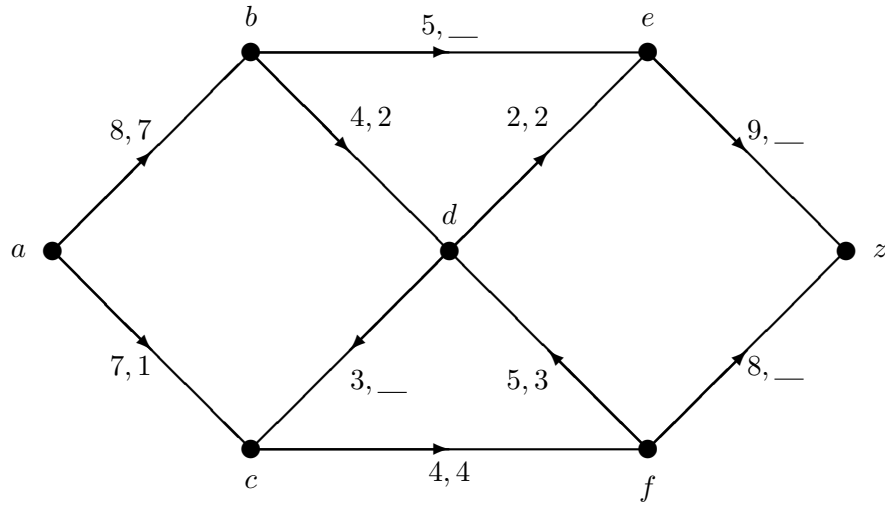


8. (10 points) Find a minimal weight spanning tree for the following weighted graph. Draw the edges on the set of vertices to the right. Indicate the algorithm you use.



NAME: _____

9. (12 points) In the network below, the first number on each edge is the capacity of the edge. The second number is the flow value on the edge for an initial flow. Find the missing flow values, and use this initial flow to find a maximal a - z flow and minimal a - z cut.



NAME: _____

10. (12 points) In the network below, the number on each edge is the capacity of the edge. Find a maximal a - z flow and minimal a - z cut in the network. (Hint: Find an initial flow “by inspection.”)

