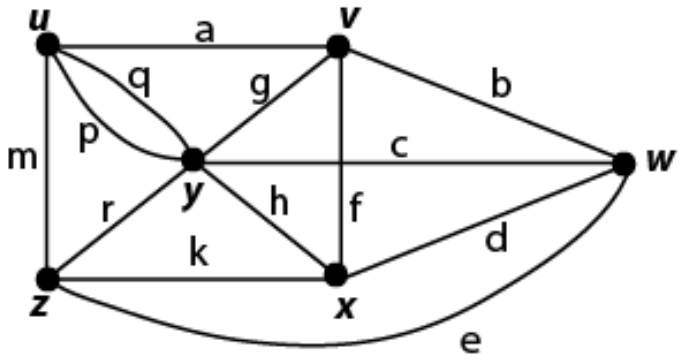
MATH 3330: Applied Graph Theory

ASSIGNMENT #4

Due Thu. Feb 18

1. In the following graph,



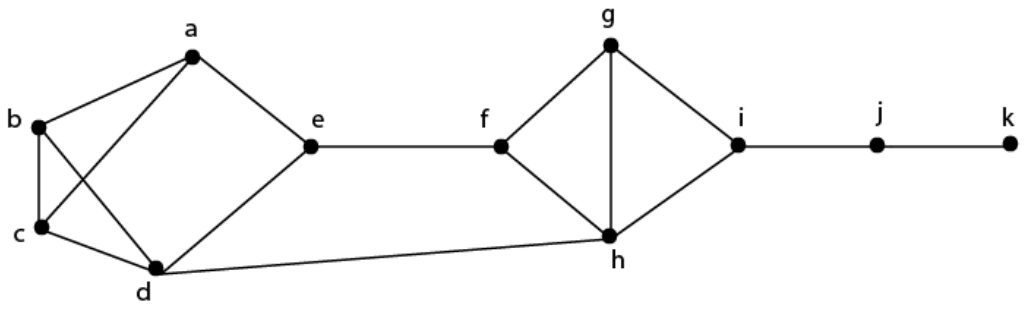
   a) Find the indicated vertex-deletion subgraphs:

      i) G – y
      ii) G – {w,z}
      iii) G – {w,v,y}

   b) Find the indicated edge-deletion subgraphs:

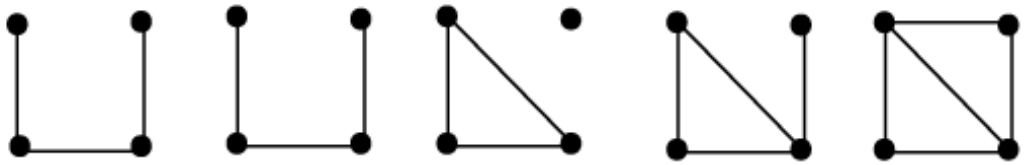
      i) G – e
      ii) G – {a,m,p,q}
      iii) G – {d,h,k}

2. In the following graph,



a) Find all the cut-vertices
b) Find all the cut-edges (Give edges by its endpoints, i.e. $\{a,b\}$ for the edge with endpoints a and b).

3. Find a graph with the vertex-deletion subgraph list given below.



4. True or false: The endpoints of a cut-edge are both cut-vertices. If false, explain why.

5. Draw a 6-vertex connected graph that has exactly seven edges and exactly three cycles.

6. True or false: There exists a connected n-vertex simple graph with $n+1$ edges that contains exactly 2 cycles. If true, give an example. If false, explain why not.

7. For the following, draw the specified tree or explain why no such tree can exist.

   a) A 14-vertex binary tree of height 3.
   b) A 16-vertex binary tree of height 3.
   c) A ternary tree of height 3 with exactly four vertices.

8. What is the relationship between the depth of a vertex v in a rooted tree and the number of ancestors of v? Explain your answer.

9. For the following, draw the root tree specified by the given array of parents.

a)

F_{vertex}	a	b	c	d	e	f	g	h	i	j
parent	-	a	b	b	b	b	b	c	c	c

b)

vertex	a	b	c	d	e	f	g	h	i
parent	-	a	b	b	c	c	d	e	e

10. Specify the rooted tree drawn below with an array of parents.