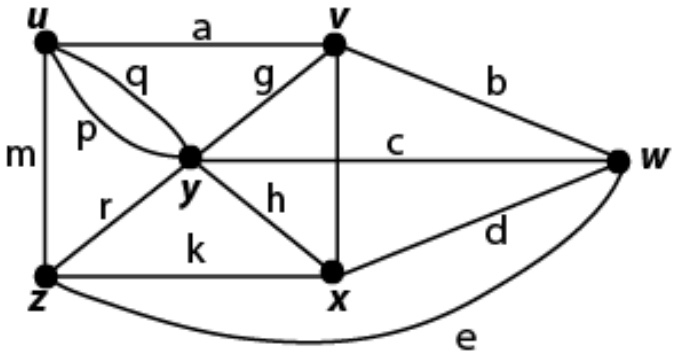
MATH 3330: Applied Graph Theory

ASSIGNMENT #3

Due Thu. Feb 11

For problems 1 to 3, please use the following graph:



1. Determine whether the given vertex and edge subsets, W and D, respectively, form a subgraph of the graph above.

   a) W={u,w,y}; D={a,b,c}
   b) W={u,w,y}; D={c,q}
   c) W={u,w,y}; D={g,h,r}

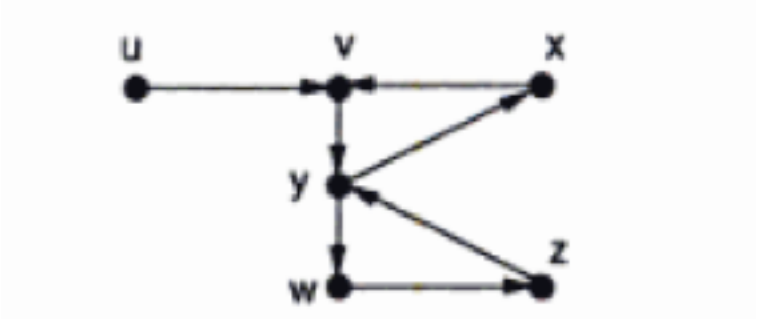
2. Find the subgraphs G(W) and G(D) induced on the given vertex and edge subsets, W and D, respectively, of the graph above.

   a) W={u,v,x}; D={c,g,h}
   b) W={u,w,y}; D={b,c,d}
   c) W={w,x,y,z}; D={c,f,h}

3. Find the local subgraphs of the given vertex in the graph above.

   a) V
   b) W
   c) x

4. Find the subdigraph G(U) induced on the given vertex subset U of the digraph below.

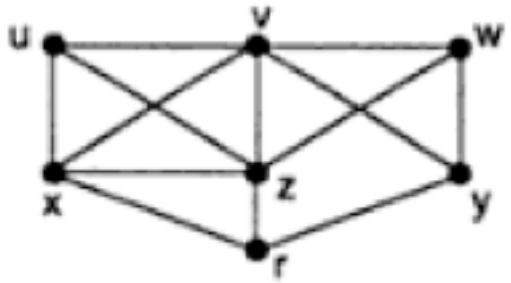


a) U={y}
b) U={u,v,y}
c) U={x,y,z}
d) U={w,x,y,z}

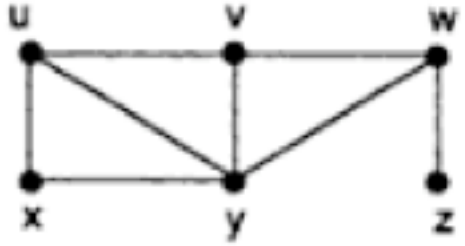
5. For each of the following graphs,

i) Find all of the cliques in the given graph.
ii) Give the clique number.
iii) Find all the maximal independent sets.
iv) Give the independence number.
v) Find the center.

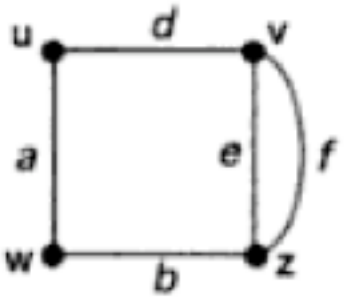
a)



b)



6. Find the edge-sets of all spanning trees of the graph below.



7. Find all possible isomorphism types of the given kind of graph:

   a) A simple 4-vertex graph with exactly 2 components.
   b) A simple 5-vertex graph with exactly 3 components.

8. Draw the indicated Cartesian product:

   a) $P_3 \times C_5$
   b) $P_3 \times 2K_3$

9. Draw the indicated join:

   a) $K_2 + K_4$
   b) $3K_1 + 4K_1$
   c) $P_3 + K_3 + C_2$