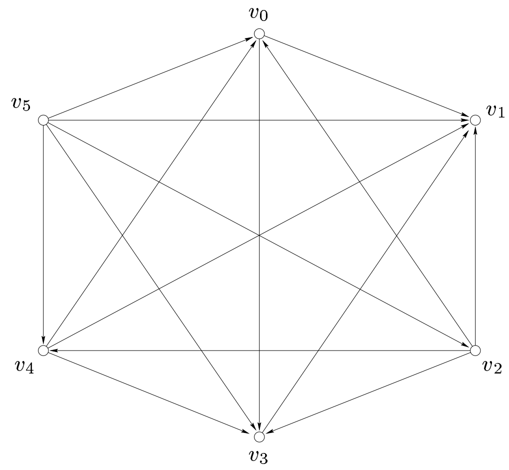
AMAT 3240 – Test #2
Fall 1999

Name: ____________________

Instructions:

- This test has 6 questions, appearing on 4 pages.
- Answer each question completely; justify your answers.
- You have 60 minutes to finish.

1. Consider the following tournament.



(a) What is the score of each vertex?

(b) Is the tournament transitive?

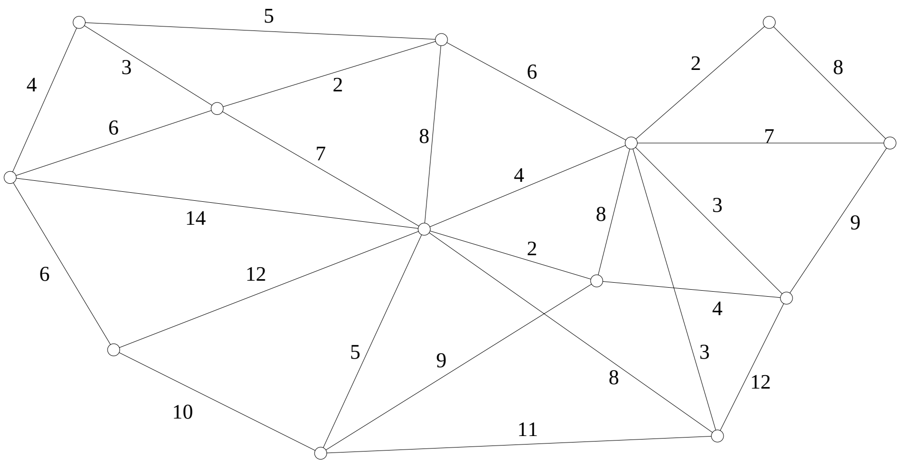
(c) By Rédei, we know that every tournament has a Hamiltonian path. Find a Hamiltonian path in this tournament.

(d) Are there any other Hamiltonian paths in this tournament? Either find one or explain why none exists.

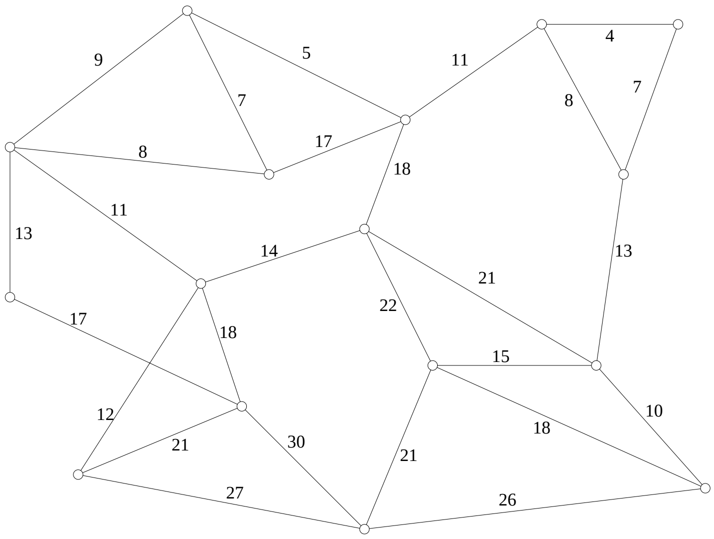
2. Suppose G is a forest consisting of k trees. If $|V(G)| = n$, then determine $|E(G)|$.

3. Find a minimum-weight spanning tree in each of the following graphs:

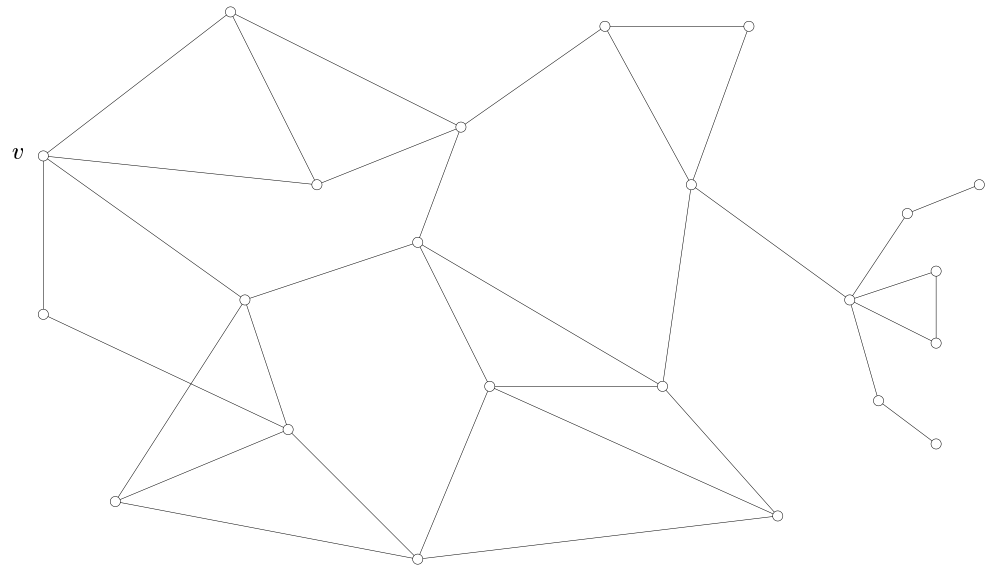
(a)



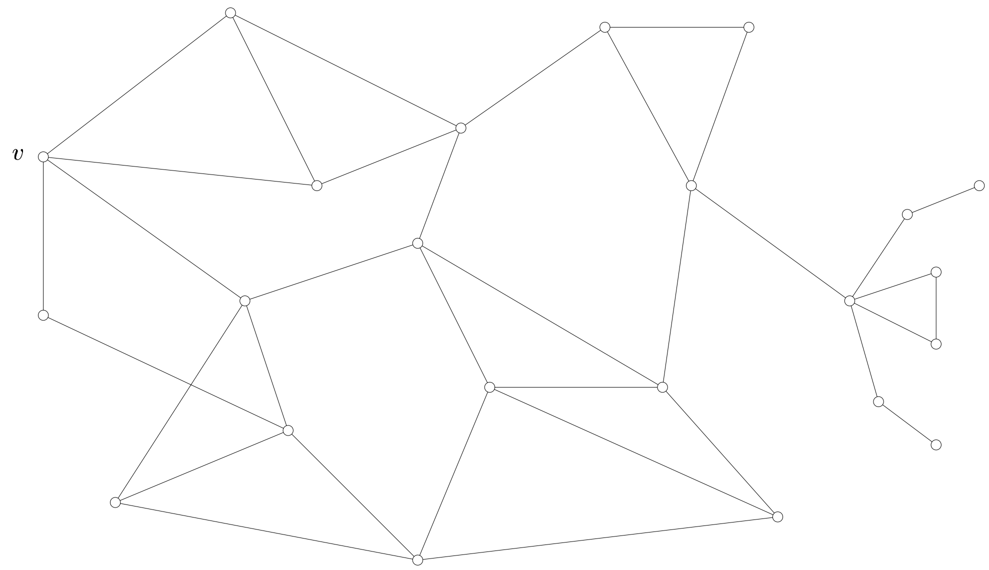
(b)



4. Build a depth-first search tree starting at v in the following graph. Also indicate the order in which vertices are added to the search tree.



5. Build a breadth-first search tree starting at v in the following graph. Also indicate the order in which vertices are added to the search tree.



6. (a) What is a strongly connected orientation of a graph G?

   (b) Prove that if G is a graph with a strongly connected orientation, then G is connected and contains no cut-edges.