WRITTEN ASSIGNMENT # 7
MATH 38
DUE: MONDAY 18, 2005

Read Section 1.4

1. What is the difference between multiple edges in graphs and multiple edges in digraphs?

2. True or false: If we remove the directions in a simple digraph we obtain a simple graph. Justify your answer.

3. What is the characterization of Eulerian diagraphs? Give an example of a digraph that is Eulerian.

4. How do directed graphs apply to finite state machines?

5. True or False: The adjacency matrix of a digraph is symmetric. Justify your answer.

6. Orient the edges of K_4 in any way you wish and compute the adjacency matrix and incidence matrix of the resulting digraph.

7. What is the difference between weakly connected and strongly connected digraphs?

8. Draw a connected simple graph with 8 vertices and 12 edges, randomly assign orientations to the edges in this graph. How many strong components are there in this digraph?

9. What is the relationship between sum of the in-degrees and the out-degrees in a digraph?

10. Define an orientation and a tournament. Give an example of a tournament and label a king in the tournament.

11. What is a de Bruijn graph on an alphabet of size 2?

12. Draw a de Bruijn graph of order 3 for the alphabet $\{a, b, c\}$. Label each vertex with a word of length two: $V(G) = \{aa, ab, ac, ba, bb, bc, ca, cb, cc\}$. Assign a direction to each edge and label the edge accordingly.