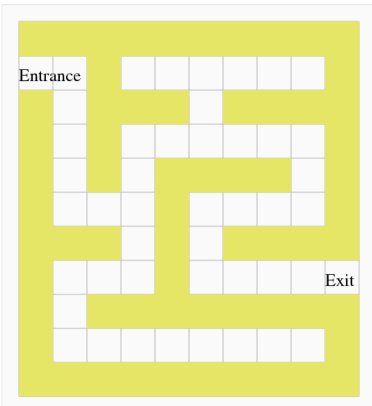
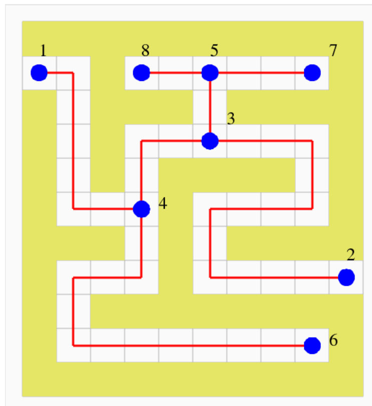
Homework #6

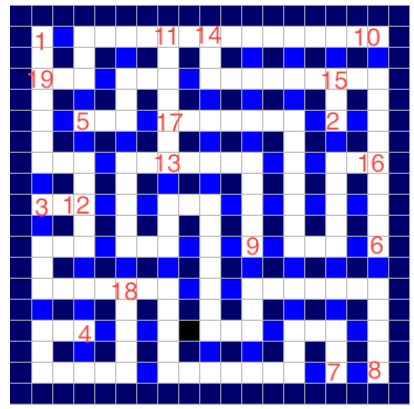
Algorithms II

Due: Friday, 18 February 2011

A *maze* is an arrangement of rooms, connected in a complicated way. A maze might have an entrance and exit, or we might be required to go from one room to another.







Problem 1:

A maze can be represented by a graph. The entrance, the exit, every dead-end, and every point where we have to make a choice should each be a node. The paths between these points become edges. The "right hand rule" suggests getting from one spot by walking with your right hand always touching the wall, turning whenever you have to to keep your hand on the wall.

Figure 1 is a simple maze and Figure 2 its corresponding graph.

1. Verify that the "right hand rule" works for the yellow maze, by listing the sequence of nodes, starting at node 1, that lead to node 2 following this rule;
2. Create an edge list for your graph and submit it;
3. Create an adjacency matrix for your graph and submit it.

Problem 2:

Assume that you are given the edge list for the blue maze in Figure 3, and that you are to find a sequence of nodes that takes you from node 1 to node 2.

- Verify that the "right hand rule" does **not** work for this maze, by listing the sequence of nodes, starting at 1, until you come back to node 1.
- A depth first search will correctly find a path from node 1 to node 2. Give the steps that such a search might use. You can stop when you reach node 2, and you may allow your example to be "lucky". Your report will indicate, at each step of the algorithm, where you are (what node), what nodes you have seen but not explored, and what node you are about to explore next.
  Step 0: I am at node 1, I see node 19, and I am about to move to node 19.
