

# Shortest Path

3-29-2010

# Opening Discussion

- Do you have any questions about the quiz?
- Do you have any questions about recursion before we begin?

# Week's Objective

- Our goal for the week is to make it so that an actor can walk from any location in a maze to any other location taking the shortest path.
- For today our goal is simply to write a method that will tell us how long the shortest path is from one place to another.

# The Approach

- This problem can be solved without recursion, but it is challenging. So instead we will design a recursive solution.
- Recursive solutions are basically built from two things. I want us to think about them.
  - Base cases: Under what conditions can you easily give an answer? What is the answer in those cases?
  - Recursive case: how could you get the shortest path if you knew it from other locations?

# Preventing Cycles

- One of the things we have to do is prevent our algorithm from running in circles. We don't want it to keep going over the same location again and again.
- To do this and to make it easy for us to look up the locations of walls, we will pass in an extra argument to the recursive function that is a 2-D array of ints. (`int[][]`)

# Wrapping the Recursion

- Because of this 2-D array, it will can't call the method directly. Instead, we need to have another method that we call that will build the array and then call the recursive method.
- This type of “wrapping” is a common technique when additional information is needed in a method that the original caller might have a hard time putting together.

# Writing the Code

- Let's write our method and try it out.

# Minute Essay

- The method we made today checks all paths through the maze. Is it clear how it does that? What could be some problems with doing that?