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2. Given the algorithm, main function, and maze shown at the end of problem 1, what are the first 12 (r,c) coordinates popped off the stack by the algorithm?

First 12 (r,c) coordinates popped off by stack:

(4,4)

(4,3)

(4,5)

(3,5)

(2,5)

(2,6)

(2,7)

(2,8)

(3,8)

(4,6)

(5,4)

(6,4)

3. Given the same main function and maze as are shown at the end of problem 1, what are the first 12 (r,c) coordinates popped from the queue in your queue-based algorithm?

First 12 (r,c) coordinates popped off by queue:

(4,4)

(5,4)

(4,5)

(4,3)

(6,4)

(4,6)

(3,5)

(7,4)

(6,5)

(2,5)

(8,4)

(6,6)

How do the two algorithms differ from each other? (Hint: how and why do they visit cells in the maze in a different order?)

The queue appears to be more efficient in finding the shortest path given these specific starting and ending coordinates in this test case because the queue pops off less coordinates. The stack algorithm will always make a decision based on the last coordinate that was pushed onto it due to the nature of the last one in, first one out property. Because the most recent coordinate is always processed first, the algorithm will continue to go along one path until it reaches a complete dead end. Then, the algorithm will backtrack to the most recent branching coordinate that doesn't result in a dead end and try to find another path until it reaches a dead end, and it repeats.

However, the queue has a first one in, first one out property so it will process the earliest points first. The queue algorithm will add onto the queue all the valid neighbor coordinates, then will process the next coordinate in the queue, which is the earliest added and will be repeated. The queue algorithm will process all the coordinates that are nearby, then it will start to process coordinates farther away (from the starting point).

For this problem, you'll turn in either a Word document named hw.docx or hw.doc, or a text file named hw.txt, that has your answer to this problem (and problem 4).