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CS 32

Homework 2

Problem 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?

1. 3 5
2. 3 6
3. 3 4
4. 2 4
5. 1 4
6. 1 3
7. 1 2
8. 1 1
9. 2 1
10. 3 3
11. 4 5
12. 5 5

Problem 4

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?

1. 3 5
2. 4 5
3. 3 4
4. 3 6
5. 5 5
6. 3 3
7. 2 4
8. 6 5
9. 5 4
10. 1 4
11. 7 5
12. 5 3

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 two algorithms are different in that the stack pops off the first element that it gets every time when there is something in the stack, while the queue pops off the last element that it has every time there is something in the queue. For the stack, the function visits the maze in the order east, north, west, south. This is because in our function, the last if-statement checks for the east spot, and the one preceding that checks for the north, and so on. This means that the stack will always check the next east spot after popping the stack until it cannot check the east spot anymore, which is when it checks the next direction, north. For the stack, since the if-statement checking for south comes first, these coordinates are pushed onto the queue first and thus popped first, causing the program to check the maze in the order of south, west, north, then east. In other words, the two different ways of solving the maze are different since the stack can only add items and remove and check items from the top, while the queue can only add items to the top and remove and check items from the bottom.