CS 32 Homework 2

1. The first 12 (r, c) coordinates being popped off the stack are (from first to 12th):

(4, 3) (3, 3) (5, 3) (5, 2) (5, 1) (6, 1) (7, 1) (8, 1) (8, 2) (6, 3) (4, 4) (4, 5)

1. The first 12 (r, c) coordinates being popped off the queue are (from first to 12th):

(4, 3) (4, 4) (5, 3) (3, 3) (4, 5) (6, 3) (5, 2) (4, 6) (5, 5) (5, 1) (4, 7) (6, 5)

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

A stack has a Last-In-First-Out structure while a queue is First-In-First-Out. While the stack looks at the latest (r, c) coordinate pushed on top of the stack, a queue looks at the oldest (r, c) coordinate in the front of the stack. Coordinates are pushed into the stack or queue in the same order: right (r, c+1), down (r+1, c), left (r, c-1), and then up (r-1, c). However, following a stack’s LIFO structure, the directions are popped out in the opposite order: up (r-1, c), left (r, c-1), down (r+1, c), and then right (r, c+1). On the other hand, a queue has a FIFO structure, meaning that they are popped out in the same order they were popped in: right (r, c+1), down (r+1, c), left (r, c-1), and then up (r-1, c).