

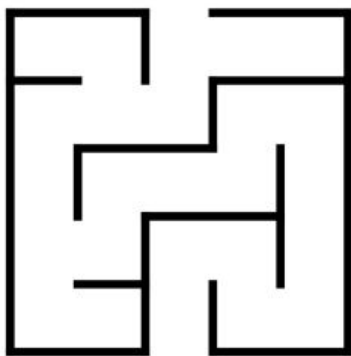
CMPUT 355 Fall 2020: Worksheet 3 Solutions

(Marked by Sahir, Ali Naiem Abadi - address questions on marking to these TAs)

Q1: (3 marks)

Version A)

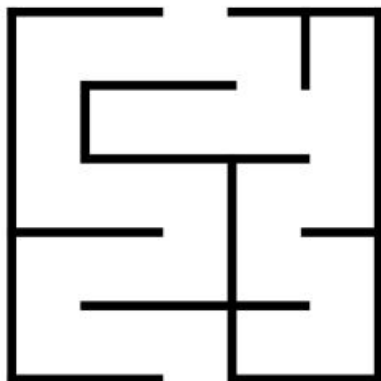
In the same style as on the course webnotes, give the edges or lines of the adjacency graph for your maze. Assume that labels of the nodes of top row left to right are a . . . e, and the next row starts from f, and so on, with the fifth row as u . . . y.



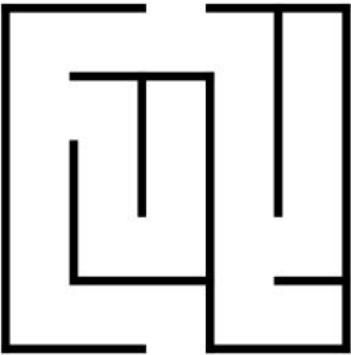
Example answer could be (only a few sample edges demonstrated): ab ac bc bg cd ef gh where edges are separated by a space. Follow the format exactly as provided (edges alphabetically ordered with small caps and no extra spaces anywhere).

Answer: ab bg cd ch de fg fk gh ij in jo kp lm lq mn ot pq pu rs rw sx ty uv xy

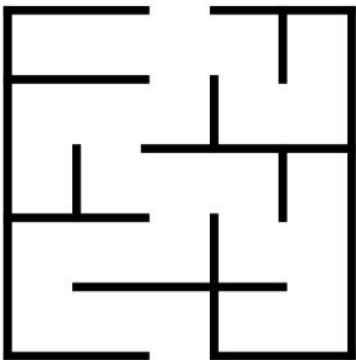
B) answer:ab af bc cd di ej fk gh hi ij jo kl lm mr no ns pq pu qr st ty uv vw xy



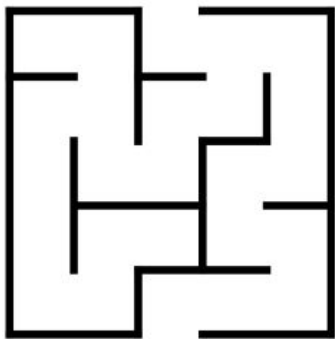
C) answer: ab af bc cd di ej fg fk gl hm in jo kp lq mr ns ot pu qr st sx uv vw xy



D) answer: ab bc cd ch di ej fg fk gh gl ij lm mn mr ns ot pq pu qr st ty uv vw xy



E) answer: ab bg cd de di ej fg fk gl hi hm jo kp lm no ns pu qr qv st ty uv wx xy



Q2:

From the class github repo, execute the python3 program simple/maze/maze.py with input m16.txt.

Q2-1. In each output maze diagram, what does a dot represent? (0.5 marks)

Answer: It shows cell has been seen (it is in queue)

Q2-2. Does every execution of maze.py on m16.txt end with the same diagram? Why, or why not? (3 marks)

Answer: No, because shuffle function randomly shuffles nbr_offset so the order that cells get explored can be different in each run. This can result in the finish node expanded from either the bottom or the left (results in a different diagram).

Q2-3. Does the output from every such execution include the diagram below? Why, or why not? (2.5 marks)

```
X   X   X   X   X   X   X   X
X           !       .   ~   ~   X
X           .       ~   ~   +   X
X           .       ~   ~   X
X   X   X   X   X   X   X   X
```

Answer: Yes it happens. Because BFS (FIFO) is used, and at this point all the nodes at the current distance are already expanded. Thus the shuffling of the shift order will still result in the same diagram occurring.

Q3:

Modify maze.py: uncomment line 61 (`#psn = fringe.pop() ...`), comment out line 62 (`psn = fringe.popleft() ...`), and comment out line 66 (`shuffle(nbr_offsets) ...`). Run the modified program with input m16.txt.

Q3-1. Does every execution of modified maze.py on m16.txt end with the same diagram? Why, or why not? (3 marks)

Answer: Yes, it ends with the same diagram. Because the line responsible for the shuffling nbr_offsets is commented out so the maze is explored in the same way every time (becomes a deterministic algorithm)

Q3-2. Is this modified program executing breadth-first-search or depth-first-search? Explain briefly. (3 marks)

Answer: Depth-First-Search (DFS):

Good example explanation: Here the deque() is acting like a stack, last in first out, so instead of searching as widely as possible we search as deeply as possible (look at each neighbor, then walk towards the neighbor seen most recently)