1. Review, and be able to solve, all problems from http://playgo.to/iwtg/en/

2. Here is a go position after the first seven moves of a game on a 3×4 board:

   ![](image)

   i) If the next moves are 8.W[pass] 9.B[pass], what is the final Tromp-Taylor score?
   

   iii) If the next move is 8.W[b2], give all legal options for move 9. Why is 9.B[c2] illegal? If both players try to maximize their final score, what will the final score be? Explain briefly.

3. Assume these rules for *terni lapilli* (three pebbles):

   - on each of their first three moves, a player places a pebble on any empty point
   - once a player has three pebbles on the board, on a move they must slide one of their pebbles along a line to an empty neighboring point; if no such move is available, they must pass
   - except for passing, a player’s move may not recreate a position that occurred earlier in the game (this is called positional superko)
   - the game ends when a player gets three pebbles in any line (that player wins) or after two consecutive passes (the game is a draw)

For the terni lapilli position game whose first 7 moves are below, explain how White can win.

   ![](image)
4. Answer these questions for the position below.

(i) Give the number of black groups, white groups, black stones, white stones, black territory, white territory and the final score, assuming komi 0. Repeat this question for komi 4.5.

(ii) From the position, assume White makes a non-pass move and then both players pass. What is White’s best move? Explain briefly.

(iii) Repeat (ii) for Black.

(iv) From the position, assume White makes some non-pass move(s) and that Black passes after each and then White passes. Assuming komi 0, what is the best score that White can achieve? Explain briefly.

(v) Repeat (iv) with colors exchanged (Black makes non-pass moves).

(vi) From the position, assume it is White’s turn, and that both players play normally and want to maximize their final score, against all possible opponent strategies. What is White’s best move? For this move, what will the final score be? Justify briefly.

(vii) Repeat (vi) for Black.
5. Algorithm 1 *random walk with remembering* at


runs on the maze below. (Also shown are cell locations, and which cells are marked when execution hits the while loop for the first time.)

Warmup question. Give a sequence in which this algorithm can mark cells so that the destination is reached.

Answer. Mark cells in this order: 0, 1, 2, 5, 8.

(i) Give a sequence in which this algorithm can mark cells so that the destination is never reached.

```
X X X X X
X + . . X 0 1 2 m . .
X . . . X 3 4 5 . .
X . . ! X 6 7 8 . .
X X X X X
```

6. (i) Below left, for the above input maze and program maze.py (FIFO version) in directory simple of the class github repo, with line shuffle(nbr_offsets) commented out, label the cells in the order they are first seen. (so the upper left cell gets label 0).

(ii) Below, next, repeat (i) for LIFO version.

(iii) Below, next, repeat (i) if nbr_offsets is changed to [(1,0), (-1,0), (0,1), (0,-1)].

(iv) Below, next, repeat (ii) if nbr_offsets is changed to [(1,0), (-1,0), (0,1), (0,-1)].

```
  0  __  __  __  0  __  __  __  0  __  __
  __  __  __  __  __  __  __  __  __  __
  __  __  __  __  __  __  __  __  __  __
  __  __  __  __  __  __  __  __  __  __
```

7. Prove/disprove: with nbr_offsets not shuffled, for some inputs,

(i) the FIFO version of maze.py takes more steps than the LIFO version.

(ii) the LIFO version of maze.py takes more steps than the FIFO version.