2018 CMPUT 396 Quiz 1 plus solution guide

(this is one of the quiz versions, the others were similar)

1. Playing go is an AI challenge because of its huge search space and because ________________

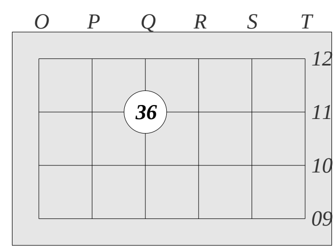
____ . AlphaGo uses its policy network to

________________ . AlphaGo beat European Go champion ____________ by score ___ — ___

and later in the city of ____________ beat Lee Sedol by score ___ — ___ .

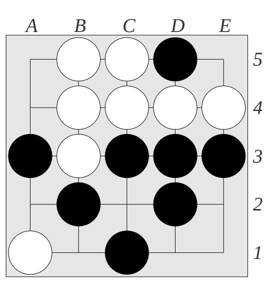
2. In Game 2 of the AlphaGo–Lee Sedol match, Lee left the room after move 36 because ________________________________ .

AlphaGo moved about ______ minutes later: mark move 37 on the diagram.



This move — called a ____________ ____________ surprised Lee because ________________________________

____

3. 

If this Go game ends at this position P, the Tromp-Taylor score is 8 stones plus ______ points for Black, 8 stones plus ______ points for White, so ______ wins by ______. From P, if White plays at E5 then Black's best reply (assume each player wants to maximize her final score) is ______ and the game will eventually end a win for ______ by ______ points. From P, if White plays at A4 then Black's best reply (assume as above) is ______ and the game will eventually end a win for ______ by ______ points.

4. On this maze, label empty cells 1 to 11 in the order in which they are discovered by a recursive depth-first search that starts at `+` . Assume that cell neighbours are checked in this order: below, right, left, above.

```
X X X X X X
X + _ _ _ X
X _ _ _ _ X
X _ _ _ _ X
X X X X X X
```

If a breadth-first search of a graph with 100 nodes and 4950 edges takes about 10 minutes, then a BFS of a graph with 200 nodes and 19900 edges should take about ______ minutes.

5.
```
4 2 5
1 3
```

This 2x3 sliding tile puzzle has ______ inversions and an ______ number of columns so it **(circle one)** is is not solvable. Below the puzzle, draw the next two levels of the search tree.

6. I based `stile_search.py` that I showed in class on **(circle one)** BFS DFS random walk because

____ .

The number of solvable 3x3 positions is **(circle one)** 3! 3!/2 9! 9!/2 . The number of solvable 3x5 positions is **(circle one)** 5! 5!/2 8! 8!/2 15! 15!/2 . The runtime of `stile_search.py` is proportional to **(circle one)** number of search-tree nodes number of search-tree nodes-plus-edges square of search-tree number of nodes square of search-tree number of nodes-plus-edges, so it will take about ______ times as long to solve a 3x5 position as a 3x3 position.

1. see the AlphaGo Nature paper abstract and wikipedia

2. Lee left for a cigarette break. AlphaGo took about 2-3 minutes for each move. shoulder hit. no top pro had played a shoulder hit this far from the edge (5th line) in a competitive match . . . and as he studied the move, he realized it was unexpectedly strong

3. Black 8 stones 4 points territory, White 8 stones 0 points territory, Black wins by 4.

   After this (bad) move by White, Black's most agressive move is to play at the end of the White row of 4 stones. White can eventually kill this Black stone, but will not be able to give the White group 2 eyes. Black can kill all, and win by 25.

   After this (good) move by White, Black should play next to the single White stone, making Black's group safe. Now White plays where Black played in the previous question, giving White's group 2 eyes. After each player has killed opponent stones inside their territory, White has 11 stones plus points, Black has 15, so Black wins by 4.

4. at right are dfs labels for this order: below, right, left, above.
   bfs takes time proportional to nodes plus edges

	9	10	11
1	8	7	6
2	3	4	5

5. odd number of columns, so solvable if and only if even number of inversions

   42513 42531 43521 have respectively 6 7 8 inversions, so yes no yes.

   here is start of search tree for first.

```
          425
          13
        /    \
     42       425
     135      1 3
    /        /   \
 4 2      425     4 5
 135       13     123
```

6. bfs, because I wanted a shortest solution

   number of $n \times m$ positions is $(n \times m)!$, exactly half are solvable, proportional to nodes-plus-edges, so $(15!/2)$ over $9!/2 = 15 * 14 * 13 * 12 * 10$ times as long