

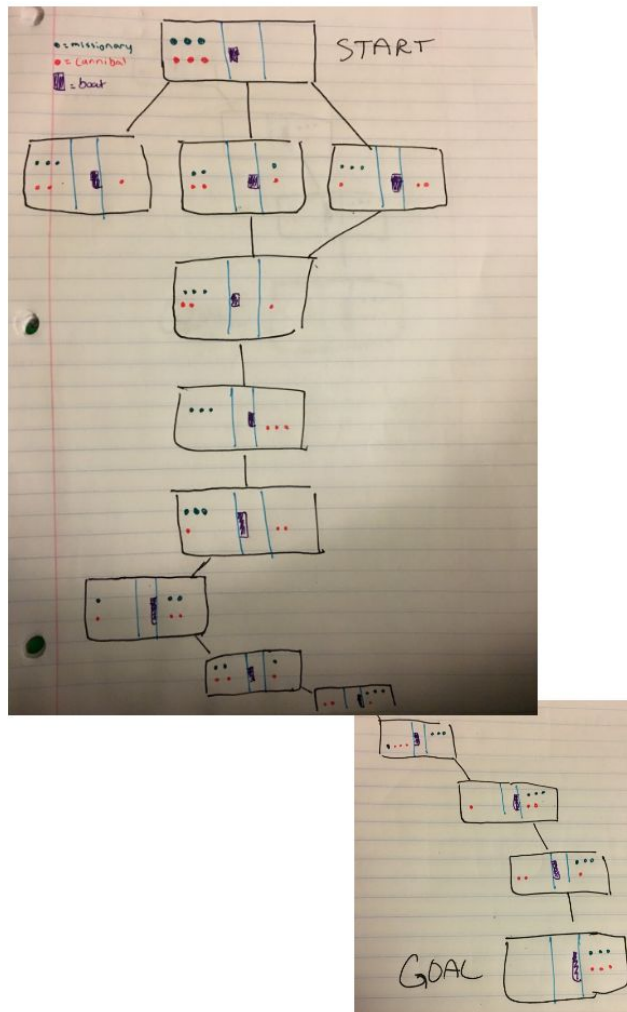
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## CS 171: Homework 2

1.



- a.
- b. Yes it is a good idea to check for repeated states because otherwise it would be possible to start regressing back to the original start state.
- c. I believe that people have a hard time solving this puzzle because there are many ways to end up in a failed state with no way to solve the problem.

2.

- a. Start State: Start with any arbitrary piece.

Successor function: Add a piece to the open hole that will fit properly from the remaining pieces.

Goal State: All pieces are used and there are no open holes in the track.

Step cost: Cost of one for every piece.

- b. Depth-first search because every solution to the problem will have the same depth. Therefore choosing an algorithm that won't run out of memory is important.
- c. In order to reach the goal state, there must be no open holes in the track and one of the forked pieces were to be removed this would leave an odd number of holes meaning that at least one wouldn't be able to get filled properly.
- d. If you pretend that every piece is unique, then there are 56 choices that you can make per peg and there 3 open pegs for each of those 56 choices giving you 168 possibilities. And since there are 32 pieces in total a potential upper bound would be  $\frac{168^{32}}{12! * 2! * 2! * 16!}$ .

### 3. 8-Puzzle:

(Please note that two print statements weren't changed properly for RBFS but they still reflect the correct results they just don't say the right thing before them.)

--- 8 PUZZLE ---

A\* SEARCH

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starting...

starting...

starting...

starting...

starting...

Average A\* search time: 2.95029296875 seconds

Average A\* storage: 2549.6

Average A\* explored: 1629.0

RBFS

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starting...

starting...

starting...

starting...

starting...

Average RBFS search time: 27.44394745826721 seconds

Average A\* storage: 22.0

Average A\* explored: 542475.6

Process finished with exit code 0