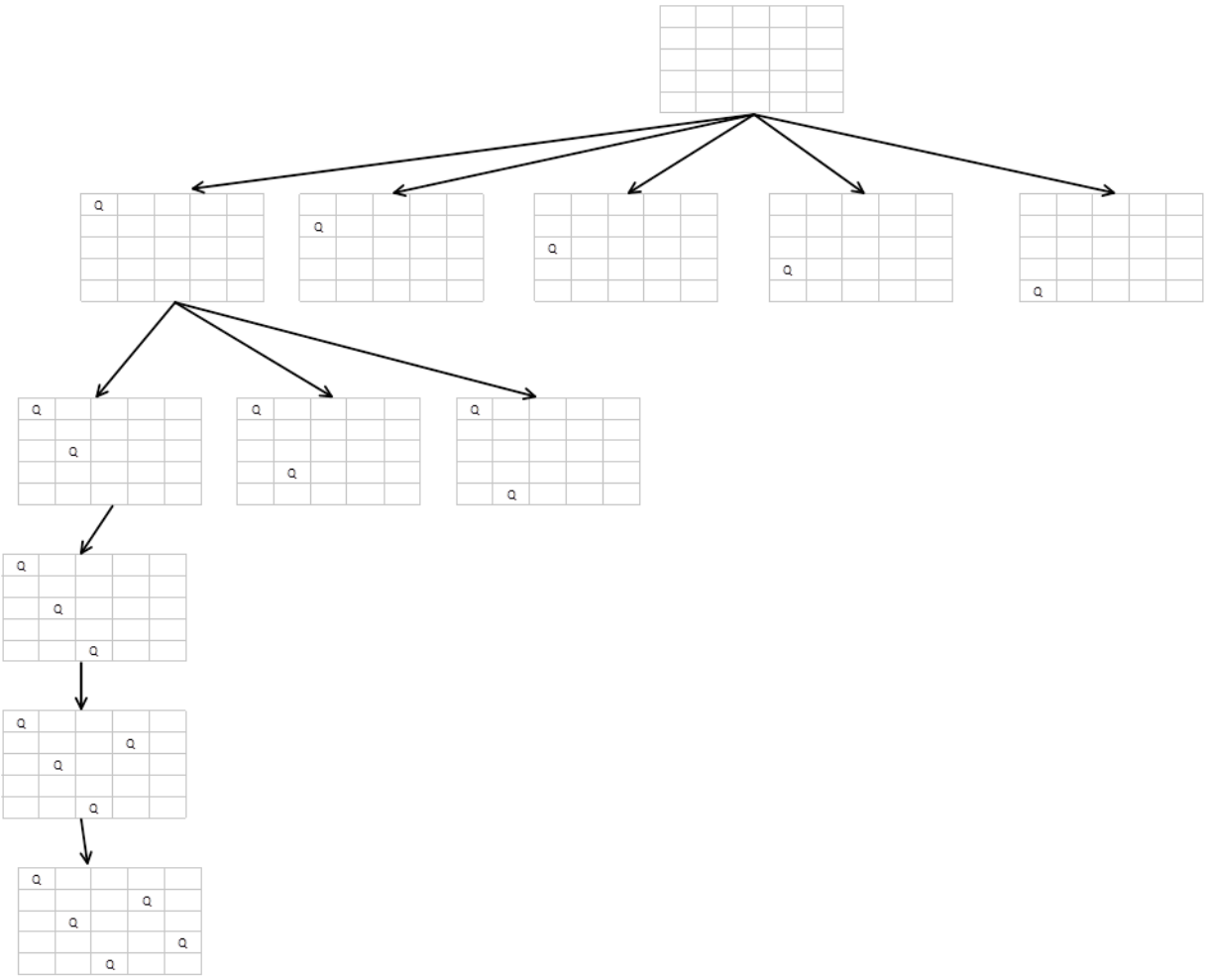
CS480 HW1

NAME: solution

Collaborators: N/A

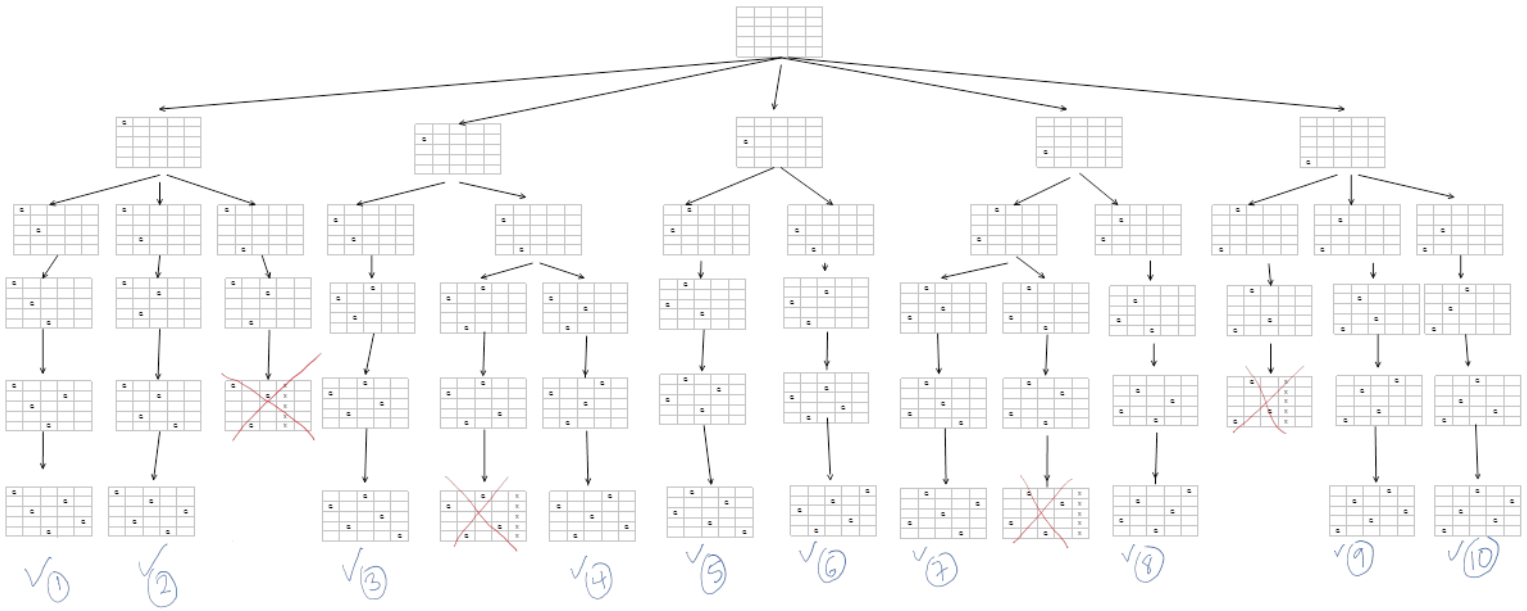
1. Solve the 5-queens problem (place 5 queens on a 5x5 board so that none is attacked) using DFS-Tree Search. The initial state is an empty board. Available actions at each state is to fill the left-most empty column. Order your actions from up to down for a given column. (This is a similar setup to the 4-queens problem we solved in class). Show the search tree.

   SOLUTION: There are two solutions for this problem, one is shown as following, and the other is search for the most right branch.

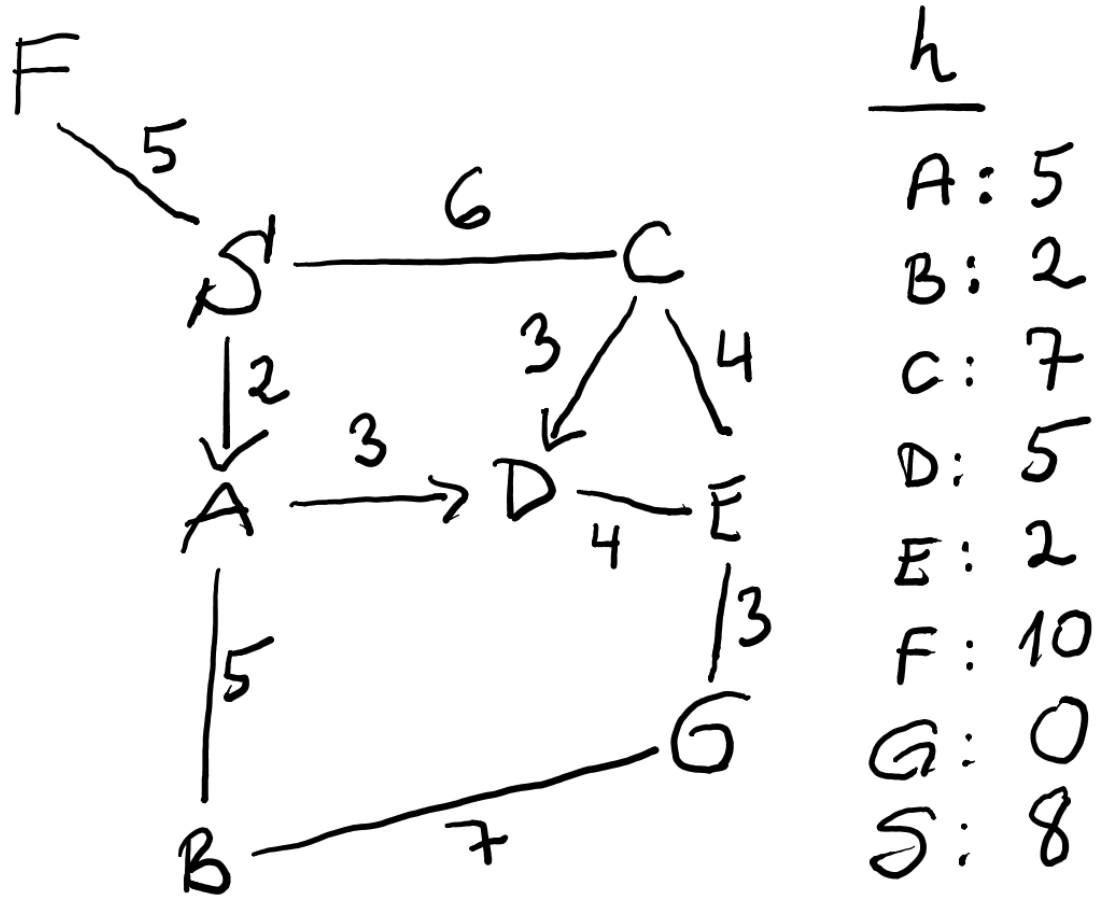


2. Solve the 5-queens problem (place 5 queens on a 5x5 board so that none is attacked) using BFS-Tree Search. The initial state is an empty board. Available actions at each state is to fill the left-most empty column. Order your actions from up to down for a given column. (This is a similar setup to the 4-queens problem we solved in class). Show the search tree.

   SOLUTION:

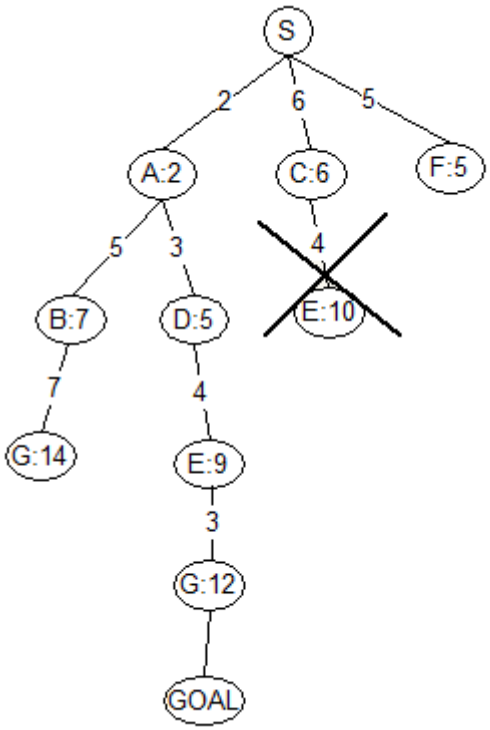


For the remaining questions, please use the following figure. We want to travel from S to G, where some of the roads allow only one way traffic. The distances between two locations are given on the figure. The estimates, h, from a location to G are given on the side.



3. Hand trace uniform-cost graph search. What is the solution path found and what is its cost? Show the search tree.

SOLUTION:

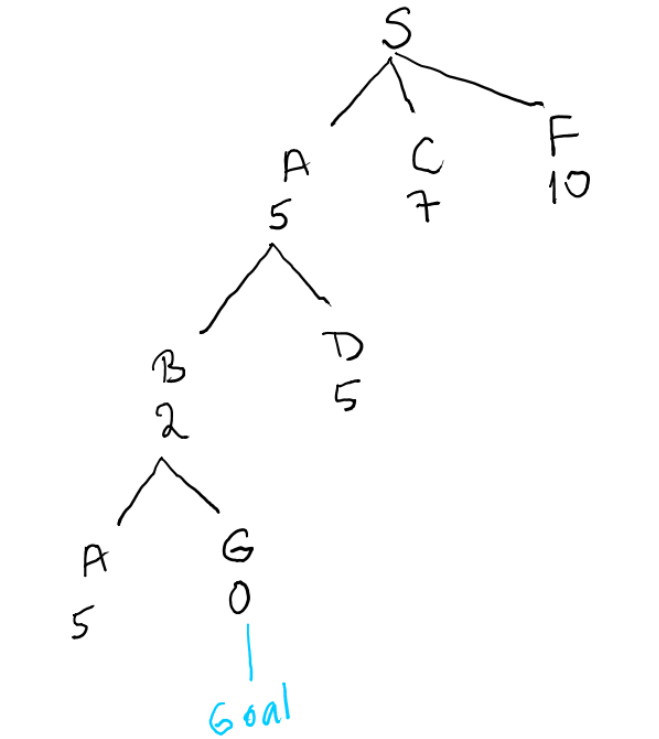


SOLUTION PATH: S->A->D->E->G

SOLUTION COST: 12

4. Hand trace greedy best-first tree search. What is the solution path found and what is its cost? Show the search tree.

SOLUTION:

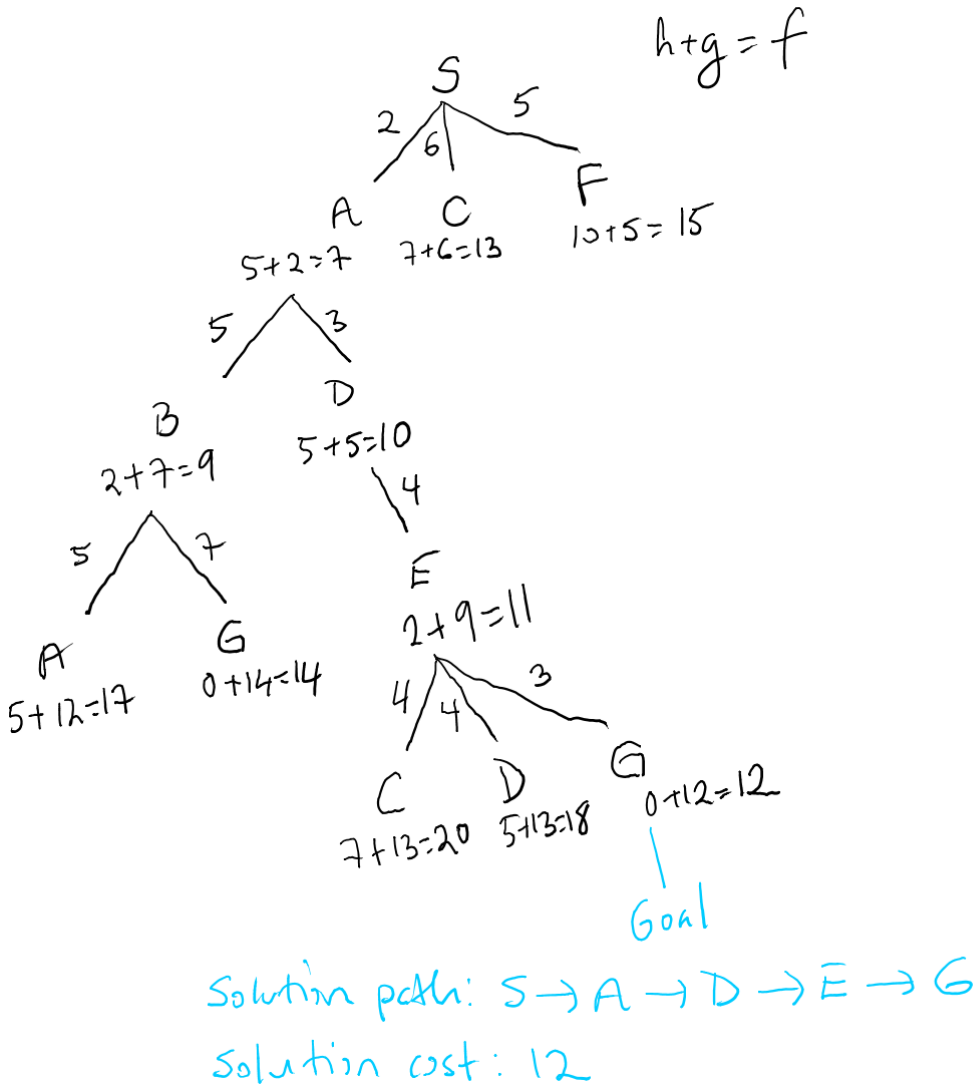


Solution path: S → A → B → G

Solution cost: 14

5. Hand trace A* tree search. What is the solution path found and what is its cost? Show the search tree.

SOLUTION:



6. Come up with an admissible heuristic function h* that dominates every possible admissible heuristic for this map; specify h*(n) for all n. Remember the definition of dominates: h1 dominates h2 if h1(n) $\geq$ h2(n) for all n.

SOLUTION:

h*(S) = 12 h*(A) =10

h*(B) =7 h*(C) =7

h*(D) =7 h*(E) =3

h*(F) =17 h*(G) =0