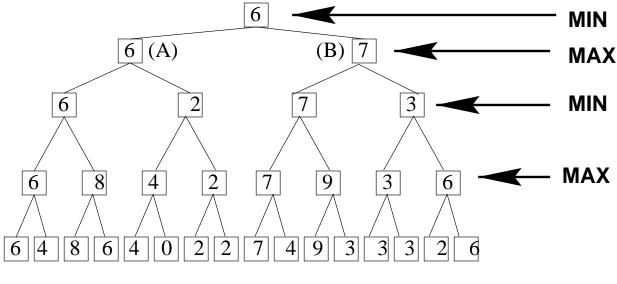# ICS 171 — Quiz #3 — TWENTY (20) minutes

1. (5 pts) NAME AND EMAIL ADDRESS:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

YOUR ID:⎯⎯⎯⎯   ID TO RIGHT:⎯⎯⎯⎯   NO. FROM RIGHT:⎯⎯⎯

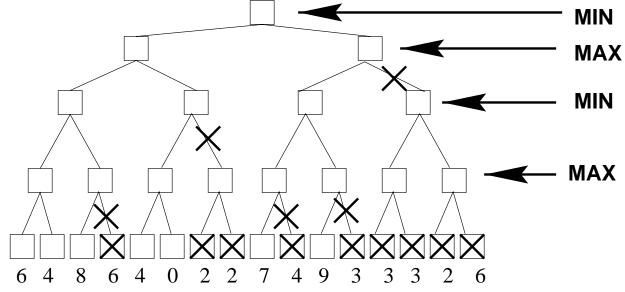2. (25 pts max, -5 for each error, but not negative) MINI-MAX SEARCH IN GAME TREES.

The game tree below illustrates one position reached in the game. It is MIN's turn to move. Inside each leaf node is the estimated score of that resulting position returned by the heuristic static evaluator. FILL IN EACH BLANK SQUARE WITH THE PROPER VALUE ACCORDING TO MINI-MAX SEARCH.
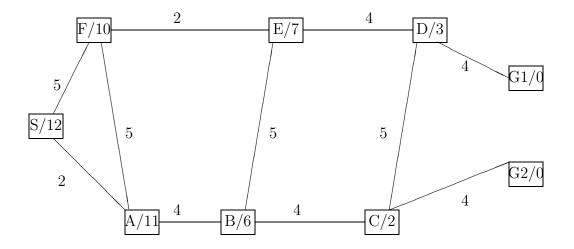

What is MIN's best move (write A or B) ⎯⎯**A**⎯⎯

2. (25 pts max, -5 for each error, but not negative) ALPHA-BETA PRUNING.

This is the same tree and conditions as above. CROSS OUT EACH LEAF NODE THAT WILL **NOT** BE EXAMINED BECAUSE IT IS PRUNED BY ALPHA-BETA PRUNING.

You do not need to fill in the branch node values.

F/10 —— 2 —— E/7 —— 4 —— D/3

D/3 —— 4 —— G1/0

F/10 —— 5 —— S/12

F/10 —— 5 —— A/11

E/7 —— 5 —— B/6

D/3 —— 5 —— C/2

S/12 —— 2 —— A/11

A/11 —— 4 —— B/6 —— 4 —— C/2

C/2 —— 4 —— G2/0

Problem 3 asks about this graph. Assume that ALL children of a node are returned in alphabetical order whenever the node is expanded. IN THIS PROBLEM, NODES *MAY* BE ON THE QUEUE OR EXPANDED TWICE OR MORE. "S" is the start node, and either "G1" or "G2" are goal nodes. The number inside each node is an estimate of the remaining distance to any goal from that node. The number next to each arc is the operator cost for that arc.

3. (45 pts max, -10 for each error, but not negative) Provide a trace of the search using A* (sum of path cost so far plus estimated remaining distance to a goal). At each step, indicate which node is expanded, what its children are, and what the resulting queue is. The first two steps are done as an example.

Write nodes as N X/Y where N is the node name (A, B, C, etc.), X is the path cost so far, and Y is the sum of path cost so far plus estimated remaining distance to a goal.

a. Q = __**S 0/12**__

Pop and expand __**S 0/12**__ Children = __**A 2/13**__ , __**F 5/15**__

b. Q = __**A 2/13**__ , __**F 5/15**__

Pop and expand __**A 2/13**__ Children = B 6/12, F 7/17, S 4/16

c. Q = B 6/12, F 5/15, S 4/16, F 7/17

Pop and expand __**B 6/12**__ Children = A 10/21, C 10/12, E 11/18

d. Q = C 10/12, F 5/15, S 4/16, F 7/17, E 11/18, A 10/21

Pop and expand __**C 10/12**__ Children = B 14/20, D 15/18, G2 14/14

e. Q = G2 14/14, F 5/15, S 4/16, F 7/17, D 15/18, E 11/18, B 14/20, A 10/21

Pop and recognize goal node __**G2 14/14**__ (G2 is OK)