CS1571
Fall 2019
9/25 Homework

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Read:

- The posted solutions to the 9-18 worksheet
- Russell & Norvig, Chapter 4.1
- Russell & Norvig, Chapter 5.1-5.3

Then, answer the following questions.

1. (2 pts) Which of the following is true. Check all that apply. Assume a finite state space and non-negative step costs, and a heuristic function *h*.

Graph search—checks for repeated states
Tree search—does not check for repeated states

___ If you are checking for repeated states, and *h* is admissible, A* is optimal.

_x_ If you are checking for repeated states, and *h* is consistent, A* is optimal.

_x_ If you are not checking for repeated states and *h* is admissible, A* is optimal.

__ If you are not checking for repeated states, and *h* is consistent, A* is optimal.

2. (4 pts) Russell and Norvig identify the two following advantages of local search algorithms. In three sentences or less, explain why each statement applies to local search. You will be graded on whether you make a correct explanation of why the implementation of local search yields each advantage.

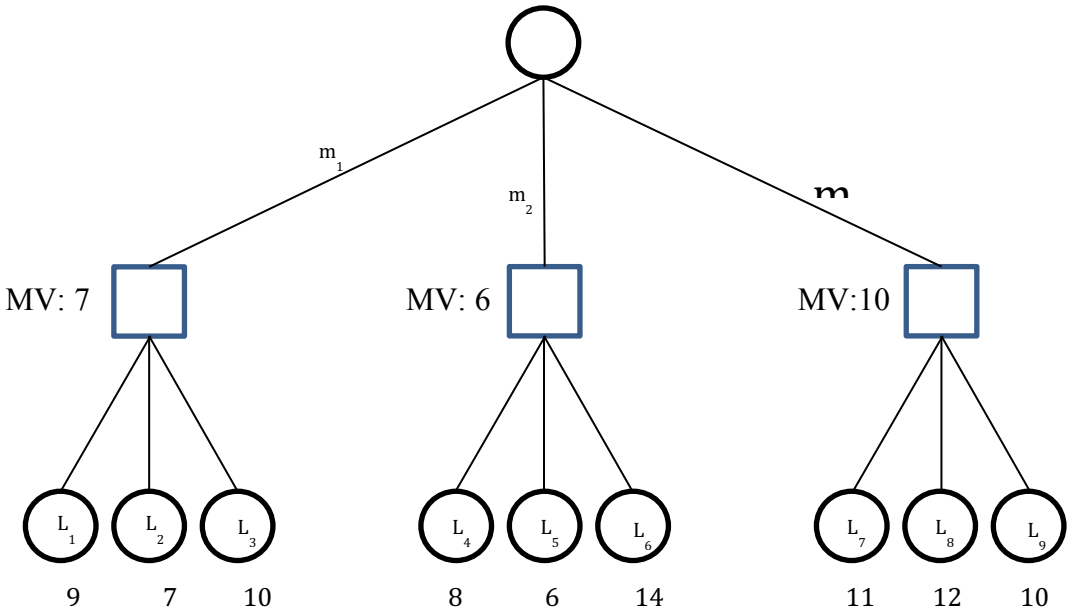
   a. They use very little memory.

   Local search algorithms use very little memory due to the fact that the paths of the search tree are not retained in memory.

   b. They can find reasonable solutions in large state spaces.

   Because this algorithm operates using a single current node rather than multiple paths and usually only moves to neighbors of that node, the implementation allows for finding a reasonable solution no matter what the size of the state space is. Since it uses the idea of elevation and location, if the elevation corresponds to the cost then it will find the global minimum and if the elevation corresponds to the objective function than it will find the global max. In both of these situations, there will be a reasonable solution that is found.

3. (4 pts) The following is a two-player game tree, with circles being MAX nodes, and squares being MIN nodes. The terminal nodes show the utility values for MAX.



a. What is the best move for MAX:
___ m_1
___ m_2
_x_ **m_3**

b. Assuming a depth-first traversal of the tree akin to the one depicted in Figure 5.5, which leaf nodes can be pruned (i.e., their values do not need to be consulted to make a decision about the best move).
___ L_1
___ L_2
___ L_3
_x_ **L_4**
_x_ **L_5**
_x_ **L_6**
___ L_7
___ L_8
___ L_9