2021/2022 EE4483 /IM4483 Homework2

1. Suppose *A* is the start state and *M* is the goal state in Fig. 2.1 below, where *h* denotes the heuristic values of the states (*cost*).

   (i) Apply the **best-first** (greedy) search algorithm to this graph to find a goal state *M*, and show the update of *Open* and *Closed* when the evaluation function relying solely on *h*.

   (ii) Briefing explain if the greedy algorithm in (i) finds the ***optimum solution*** to goal state *M*.

   (iii) Use the evaluation function given by: $f(n) = g(n) + h(n)$, where $g(n)$ measures the actual length of the path from any state *n* to the start state *A*, and $h(n)$ is a heuristic estimate from state *n* to a goal, as given in (i). Illustrate the update Fig. 2.1 with the $f(n)$ for each state.

   (iv) Apply A* search to the updated Fig.2.1 in (iii) to find the goal, and show the update of the *Open*, and *Closed*. Can A* find the optimal solution now ?
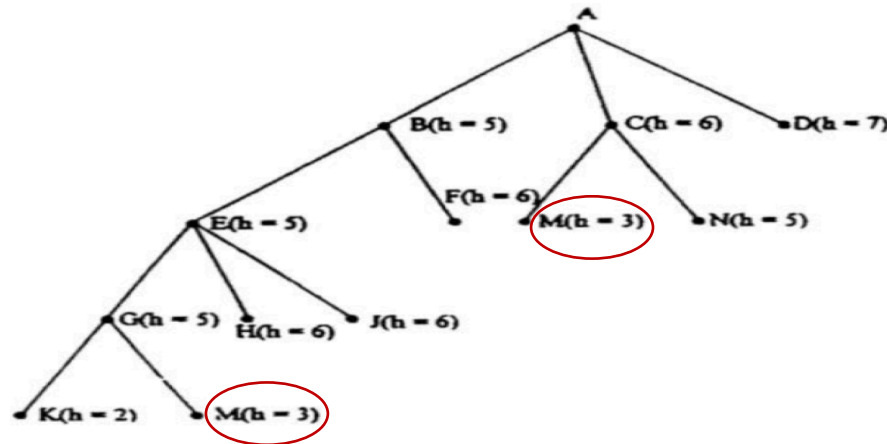

Fig. 2.1 The Tree

2. Consider the game tree given in Fig.2.2, and assume that the first player is the maximizing player. Which one of the branches should the first player choose? And which state will the game end up? Briefly explain your answer.
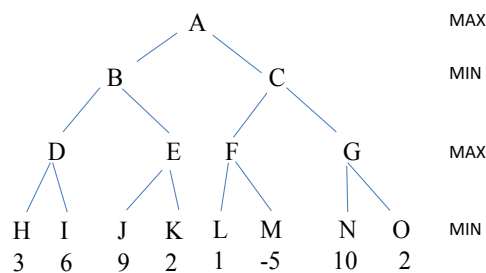

Fig. 2.2 The game tree

3. Consider the game tree given in Fig.2.2, and assume that the first player is the maximizing player.
   (i) Assuming that nodes are searched **left-to-right** using the alpha-beta pruning method, list all the nodes that will not be examined.
   (ii) Assuming that nodes are searched **right-to-left** using the alpha-beta pruning method, list all the nodes that will not be examined.