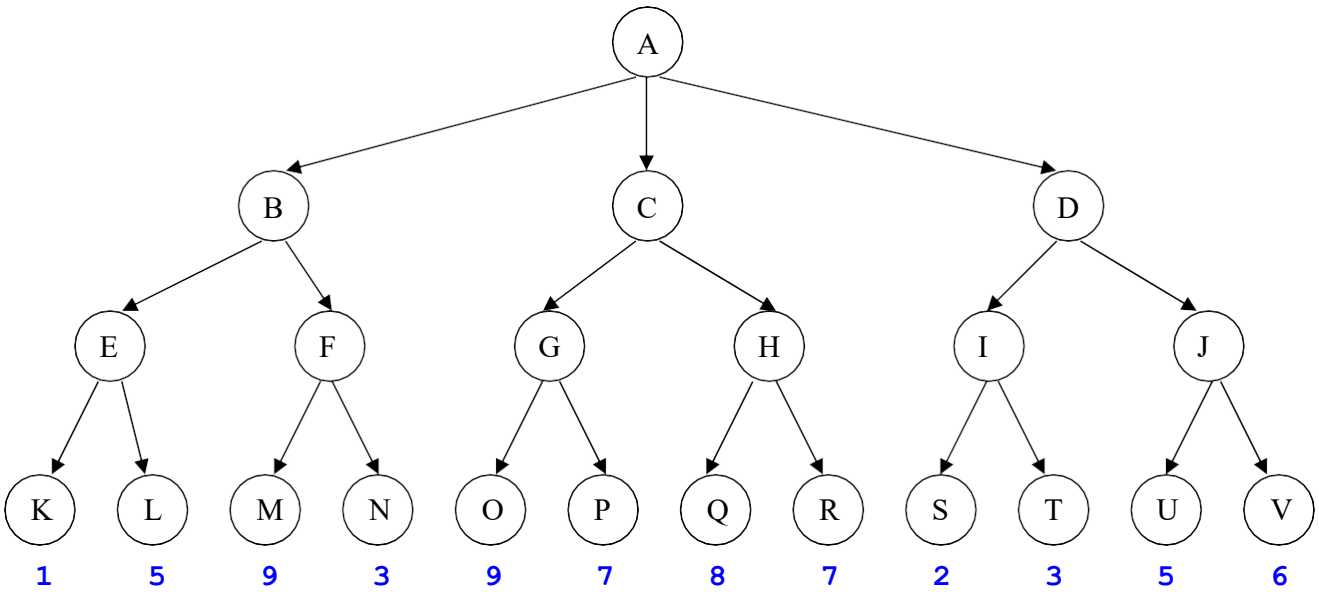
COS30019 - Introduction to Artificial Intelligence
Tutorial Problems Week 5

Task 1: For the following game tree:

(a) The first player (MAX) is trying to maximise the final score. Clearly indicate the max and min layers as part of your answer.
(b) Use minimax to determine the best move for MAX.
(c) Which nodes will not be examined if the alpha-beta procedure is used?
(d) In which order will the nodes be examined by the alpha-beta procedure?
(e) Did the alpha-beta procedure give the same best move (for MAX) as minimax?
(f) Draw a new game tree by re-ordering the children of each internal node, such that the new game tree is equivalent to the tree above, but alpha-beta pruning will prune as many nodes as possible. Which nodes will be pruned by the alpha-beta procedure in this case?



Task 2: In the following, a "max" tree consists only of max nodes, whereas an "expectimax" tree consists of a max node at the root with alternating layers of chance and max nodes. At chance nodes, all outcome probabilities are non-zero. The goal is to find the value of the root with a bounded-depth search.

a) Assuming that leaf values are finite but unbounded, is pruning (as in alpha-beta) ever possible in a max tree? Give an example, or explain why not.
b) Is pruning ever possible in an expectimax tree under the same conditions? Give an example, or explain why not.

Task 3: For the following game tree:

(a) The first player (MAX) is trying to maximise the final score. Clearly indicate the max and min layers as part of your answer.

(b) Use minimax to determine the best move for MAX.

(c) Use alpha-beta pruning to determine the best move for MAX.