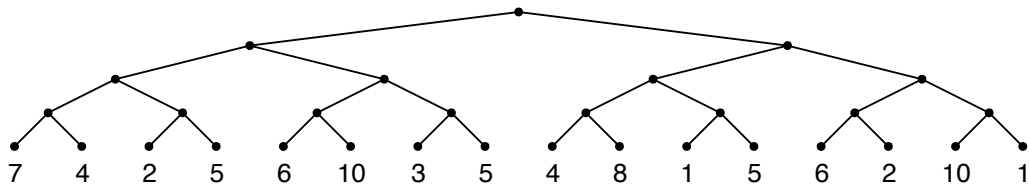


1. (a) Describe possible procedures for deriving heuristics for a problem to be solved using search, and how you might combine multiple heuristics into a single useful heuristic. [5]
- (b) Explain the operation of the minimax algorithm for adversarial search, and state the assumptions under which it is optimal and complete. [3]
- (c) In the context of the following game tree, use the minimax algorithm to determine which move the first player should choose, and what utility they should expect. Assume that the first player aims to maximise their utility. You should show the resulting search tree. [4]



- (d) Describe the alpha-beta pruning algorithm for minimax and show how it operates on the game tree in part (c), assuming that the first player is the maximising player. State which move the first player should choose. [7]
- (e) In games where the legal moves by a player are determined by chance, explain how the minimax algorithm can be extended to determine the optimal move for a player. [2]
- (f) Describe how to adapt the search when using the minimax algorithm, to avoid going down to the leaf nodes of the tree. [4]