

ECS 170 Homework 3

Hardy Jones

999397426

Professor Davidson

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1. We discussed the $\alpha - \beta$ pruning technique for improving the runtime of the minimax algorithm. Given a game tree with maximum depth m , branching factor b , and minimum depth of an optimal state d :

- (a) What is the worst case runtime?

The worst case runtime is $O(b^m)$.

- (b) What is the best case runtime?

The best case runtime is $O(b^{\frac{m}{2}})$

- (c) Under what condition can we achieve best case runtime?

The best case can be achieved if we examine the best successors first.

2. Consider the following min-max game tree.

- (a) Execute $\alpha - \beta$ pruning on the example. First, write the minimax value at each node. Then cross out the branches that get pruned by $\alpha - \beta$ pruning. If a branch does get pruned, circle the nodes under that branch that you had to explore in order to decide to prune the branch.

