CSE 486 – Introduction to Artificial Intelligence: Assignment #2

Due on 27 September 2023 at 11:59pm

Dr Khodakhast Bibak Section A

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Problem 1

(8 points) Suppose we want to construct three new airports in a given country. The objective is to minimize the distance from each city to its nearest airport. Describe the gradient descent and explain how this technique can help us to solve this problem. Write your solution mathematically as we discussed in class.

Solution

TODO

Problem 2

(0 points) Optional.

Problem 3

(0 points) Optional.

Problem 4

(4 points)

Part A

(2 points) Give a set of broad conditions under which A^* search reduces to BFS.

Solution

TODO

Part B

(2 points) Does A^* always return an optimal solution? Explain.

Solution

TODO

Problem 5

(6 points)

Part A

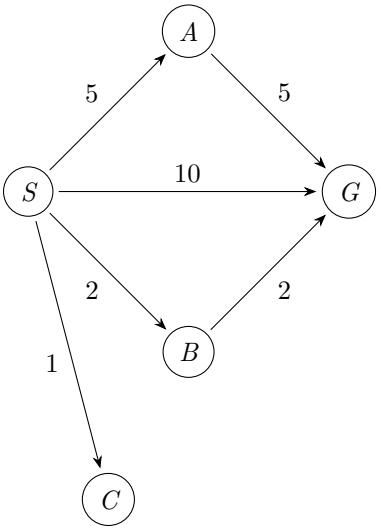
(3 points) When would DFS be a better choice than A^* search?

Solution

TODO

Part B

(3 points) Which path will A^* return for the following search problem?



Node	h
S	4
A	3
B	2
C	100
G	0

Solution

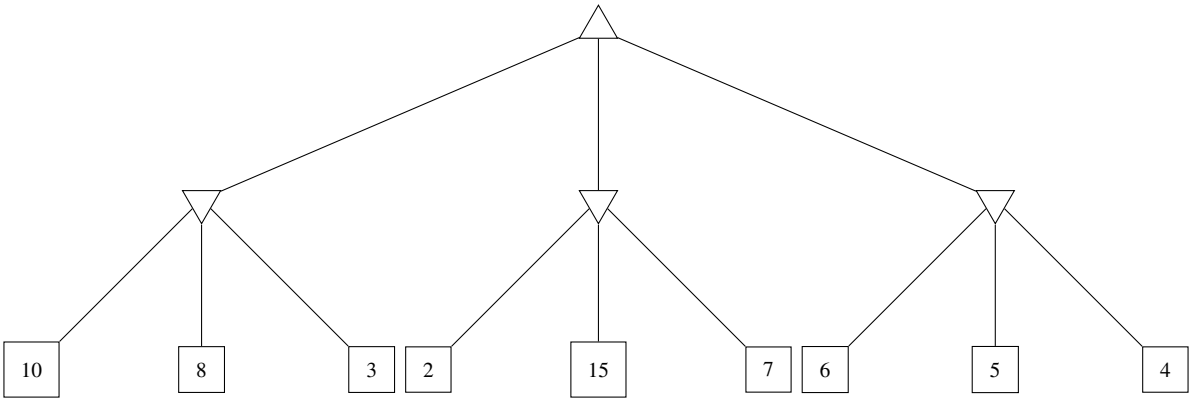
TODO

Problem 6

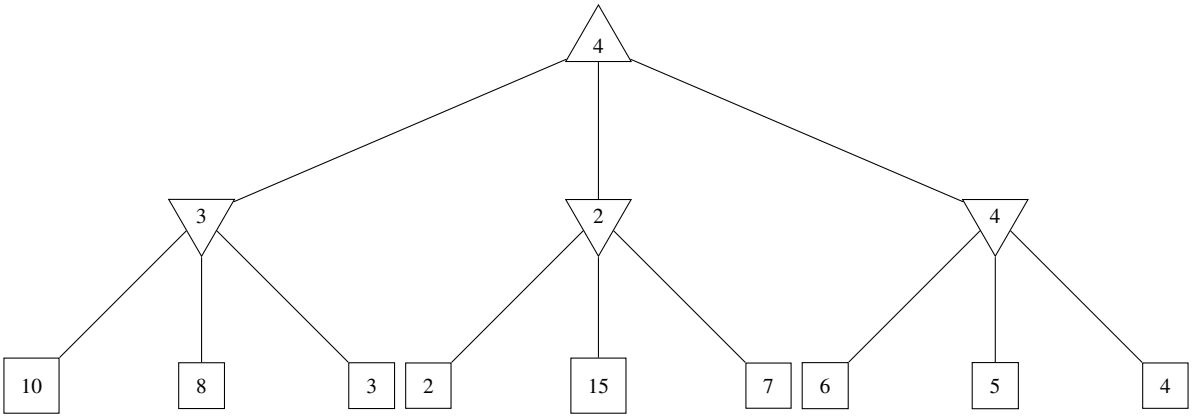
(6 points)

Part A

(4 points) Consider the zero-sum game tree shown below. Triangles that point up, such as at the top node (root), represent choices for the maximizing player; triangles that point down represent choices for the minimizing player. Assuming both players act optimally, fill in the minimax value of each node.



Solution



Part B

(2 points) Which nodes can be pruned from the game tree above through alpha-beta pruning? If no nodes can be pruned, explain why not. Assume the search goes from left to right; when choosing which child to visit first, choose the left-most unvisited child.

Solution

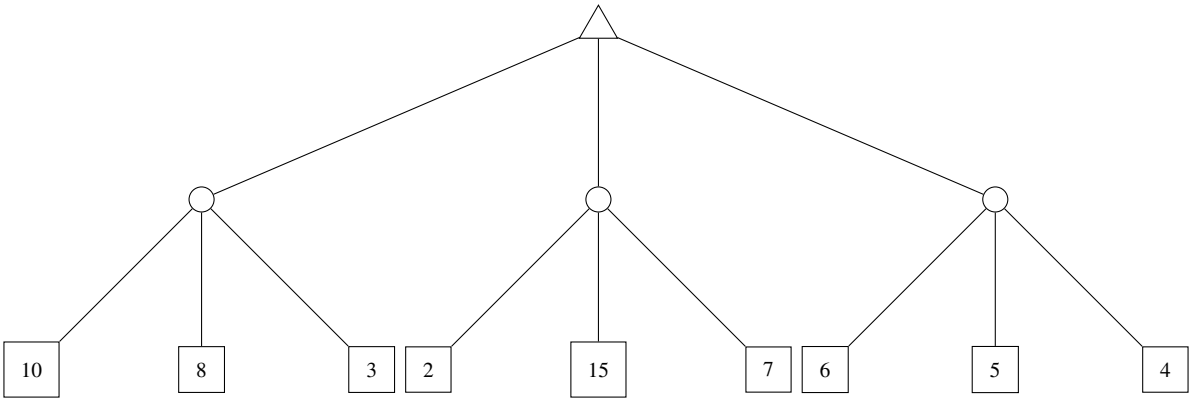
TODO

Problem 7

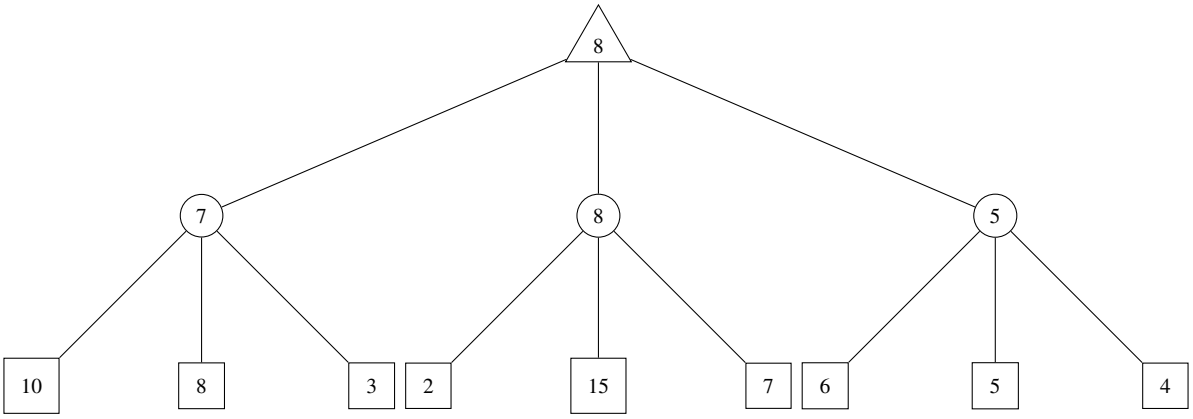
(6 points)

Part A

(4 points) Again, consider the same zero-sum game tree, except that now, instead of a minimizing player, we have a chance node that will select one of the three values uniformly at random. Fill in the expectiminimax value of each node. The game tree is redrawn below for your convenience.



Solution



Part B

(2 points) Which nodes can be pruned from the game tree above through alpha-beta pruning? If no nodes can be pruned, explain why not.

Solution

TODO