

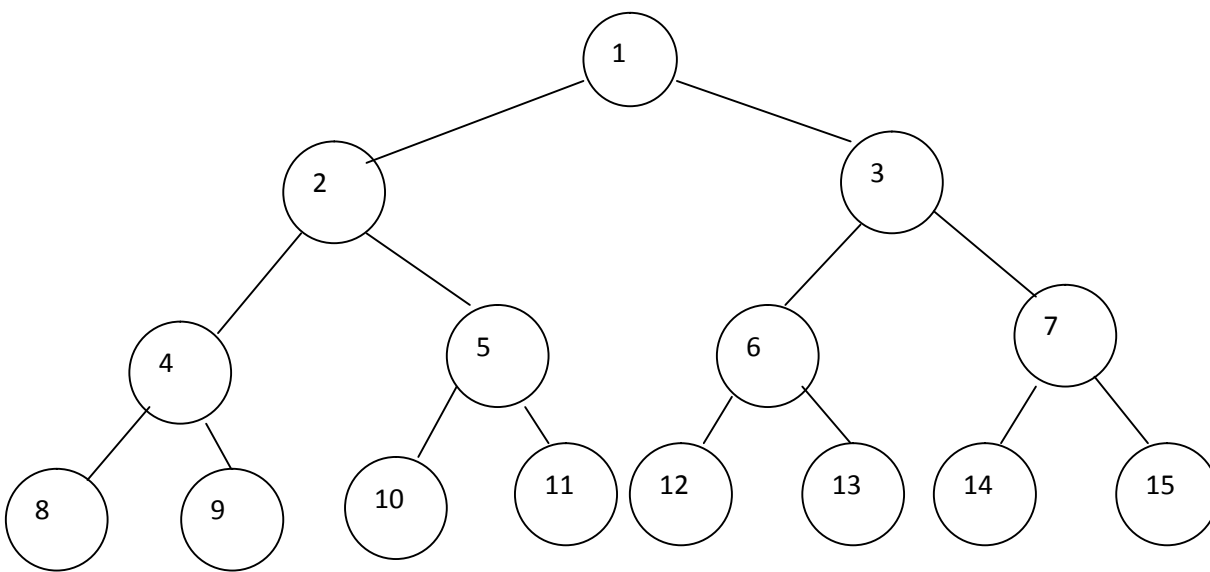
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Hw2

3.8) Consider a state space where the start state is number 1 and the successor function for state  $n$  returns two states, numbers  $2n$  and  $2n+1$

a) Draw the portion of the state space for states 1 to 15



b) Suppose the goal state is 11. List the order in which nodes will be visited for breadth first search, depth-limited search with limit 3 and iterative deepening search.

BFS: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

DFS: 1, 2, 4, 8, 9, 5, 10, 11

IDS: 1      1,2,3      1,2,4,5,3,6,7      1,2,4,8,9,5,10,11

c) Would bidirectional search be appropriate for this problem? If so, describe in detail how it would work.

Bidirectional search implies that this search is going two directions at the same time that one direction is searching from the root forward and the other direction is searching backward from the goal. This can be done by expanding the branch factor at some constant  $b$  and the distance of the goal of another constant  $d$ , but it is  $d/2$  since it is going half the path. To a point, both directions will seize when they reach somewhere at the middle. For this problem the goal is 11, the forward direction would have gone to 1, and 2, and the backward direction would have gone from the goal, which is 11, and back up to 5.

d) What is the branching factor in each direction of the bidirectional search?

The branching factor for forward is 2 while backward has 1

e) Does the answer to (c) suggest a reformulation of the problem that would allow you to solve the problem of getting from state 1 to a given goal state with almost no search?

It is apparently that is the case since there is only 1 path to reach to the goal, which is 11 from state 1