Important: This is an open book test. You can use any books, notes, or paper. Do not log into the computer during the test. Any calculations and rough work can be done on the back side of the test pages. You will lose five points for not writing your name.

1. [10 pt] Give an algorithm to count the number of nodes in a binary search tree. The tree may or may not be balanced. What is the time complexity of your algorithm?
2. [10 pt] Let \( w = \{5, 7, 10, 12, 15, 18, 20\} \) and \( m = 35 \). Find all possible subsets of \( w \) that sum to \( m \).
3. [10 pt] Given two sets $S_1$ and $S_2$, the disjoint sets problem is to check whether the sets have a common element. Present an $O(1)$ time nondeterministic algorithm for this problem.

4. [5 pt] What is the difference between a live node and a dead node? Between BFS and DFS, which algorithm will have more live nodes at any given instance?