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 loose 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?