Extra Counting Problems

1. How many different **binary max-heap**s are there that contain exactly the 7 nodes {0, 1, 2, 3, 4, 5, 6}?

2. How many integer solutions are there for the equation: $x + y + z = 12$, where $x, y, z >= 2$?

3. How many **binary search trees** have the **pre-order traversal** [3, 1, 2, 4, 5, 7]? (Hint: this is a trick question)

4. How many 8 character passwords could you make from the characters {a-z}, {A-Z}, {0-9} (i.e. all the lowercase letters, uppercase letters, and digits) under each of those restrictions:
    a. There is at least one lowercase letter, one uppercase letter, and one digit.
    b. There is no restriction at all.

    Which of the cases, in theory, is more favorable to a hacker?

5. How many 6 bit strings contain the following pattern: 1010? (examples: 101010, 010100; non-examples: 110110, 001011)