Discrete Structures - Spring 2001 Examination 3

1. How many distinct words can I create from the letters of the words:
a. BALTIMORE **b.** PHILADELPHIA

2. How many distinct ways can I arrange 10 people in a circle if a certain pair must sit next to one another?

3. How many ways can a state issue 8-character license plates if the characters are one of 26 letters or 10 digits, and the state wants:
a. the characters to alternate letter, digit, letter, digit, etc., with the first character a letter?
b. the second character to be a letter and the last three to be digits?

4. Given the alphabet $\{w,x,y,z\}$, how many 12-long strings have 2 w' s, 3 x's, and 4 y's?

5. How many ways can I arrange 10 Math, 15 Computer, and 20 Chemistry books on a shelf...
a. ...if all the books of the same type must be grouped together?
b. ...if I all the books of the same type must be grouped together and the Math books must be in the middle?

6. The ACME Candy company makes 33 different varieties of candy.
a. How many ways can they create gift boxes containing 50 pieces of candy?
b. How many ways can they create gift boxes containing 50 pieces of candy, if at least one piece of each type must be in the box?

7. Use the iterative method to find the particular solution of the recurrence relation:

$$s_n = 2s_{n-1} + 5 \quad \text{with } s_0 = 1$$

8. Find the characteristic polynomial to the recurrence relation:
a. $s_n = 8s_{n-1} - 3s_{n-2}$ **b.** $s_n = 8s_{n-2} - 3s_{n-5}$

9. Find the general solution to the recurrence relation
a. $s_n = -3s_{n-1} + 28s_{n-2}$ **b.** with characteristic polynomial roots: 3,3,3,4,4,4,4

10. Find the particular solution to the recurrence relation whose general solution is:

$$s_n = A(-4)^n + B3^n, \quad \text{subject to } s_0 = 16 \text{ and } s_1 = -1.$$