

Fall 1997 - DISCRETE STRUCTURES - CMSC 203 - EXAM 3

1. A restaurant's menu consists of 8 beverages, 7 appetizers, 6 salads, 15 entrees, 10 desserts, and 9 coffees. How many distinct dinners can they serve if each dinner contains:

(a) a beverage, an appetizer, a salad, an entree, a dessert, and a coffee?

(b) a beverage, either an appetizer or a salad, an entree, and either a dessert or an coffee?

2. Suppose I have a standard 52-card deck of cards.

(a) How many 5-card poker hands do not contain the  $7♥$ ?

(b) How many 5-card poker hands form a straight (i.e.  $4♣, 5♦, 6♣, 7♥, 8♠$ ) or a straight-flush (i.e.  $4♣, 5♣, 6♣, 7♣, 8♣$ )?

3. How many permutations are there of the words:

(a) FLORIDA

(b) ALABAMA

4. (a) How many 10-long binary strings have seven 1's?

(b) How many 10-long binary strings have at least three 1's?

5. A candy store sells 30 different types of candy.

(a) How many ways can they fill a box with 100 pieces of candy?

(b) How many ways can they fill a box with 100 pieces of candy if there must be at least 3 pieces of each type of candy in each box?

6. Show that  $\binom{10}{7} - \binom{9}{7} = \binom{9}{6}$

7. Use the Iteration Method to solve the Recurrence Relation,  $s_n = s_{n-1} + 5n$  with  $s_0 = 8$ .

8. (a) Find the Characteristic Polynomial of the recurrence relation:

$$2s_n + 3s_{n-1} - 4s_{n-2} - 5s_{n-3} + s_{n-4} = 0.$$

(b) Find the general solution of :  $s_n = 13s_{n-1} - 42s_{n-2}$  .

(c) Find the particular solution of the recurrence relation whose general solution is:

$$s_n = A(3)^n + B(-7)^n, \text{ when } s_0 = 2 \text{ and } s_1 = 26 ?$$