

# DISCRETE STRUCTURES - CMSC 203 - EXAM 3 - Spring 1998

1. A restaurant's menu consists of 6 beverages, 8 appetizers, 10 salads, 12 entrees, 14 desserts, and 16 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  $9\heartsuit$  and the  $2\spadesuit$ , at the same time?
  - (b) How many 5-card poker hands form a straight (i.e.  $4\clubsuit, 5\diamond, 6\clubsuit, 7\heartsuit, 8\spadesuit$ ) or a straight-flush (i.e.  $4\clubsuit, 5\clubsuit, 6\clubsuit, 7\clubsuit, 8\clubsuit$ )?
3. How many permutations are there of the words: (a) NETWORK (b) ETHERNET
4. (a) How many 10-long binary strings have six 1's?  
(b) How many 10-long binary strings have at most three 1's?
5. A candy store sells 50 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 200 pieces of candy if there must be at least 3 pieces of each type of candy in each box?
6. Show that  $\binom{15}{7} - \binom{14}{7} = \binom{14}{6}$
7. Use the Iteration Method to solve the Recurrence Relation,  $s_n = s_{n-1} + 7n$  with  $s_0 = 8$ .
8. (a) Find the Characteristic Polynomial of the recurrence relation:  
$$8s_n + 5s_{n-1} - s_{n-2} - 4s_{n-3} + 9s_{n-4} = 0.$$
- (b) Find the general solution of :  $s_n = -15s_{n-1} + 250s_{n-2}$  .
  - (c) Find the particular solution of the recurrence relation whose general solution is:  
$$s_n = A(5)^n + B(-7)^n, \text{ when } s_0 = -2 \text{ and } s_1 = 38 ?$$