DISCRETE STRUCTURES - CMSC 203 - EXAM 3 - Fall 1996

1. A restaurant's menu consists of 8 beverages, 11 appetizers, 6 salads, 24 entrees, 9 desserts, and 12 aperitifs. How many distinct dinners can they serve if each dinner contains:

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

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

2. How many ways can I arrange 6 Comedy video tapes, 7 Action tapes, 8 Drama tapes, 9 Horror tapes, and 10 Foreign tapes on a shelf if:

(a) I want all the Action tapes first, followed by the Comedy tapes, then the Drama tapes, then the Foreign tapes, and finally, the Horror tapes last?

(b) I only want all the tapes of the same type to be grouped together?

3. How many permutations are there of the words: **(a)** COMPUTER

(b) CALCULATOR

4. (a) How many CRAY words are there ? (A CRAY word contains eight 8-bit bytes)

(b) How many CRAY words contain no repeated bytes?

5. How many integer solutions are there to: $A + B + C + D + E + F = 60$

(a) with $A, B, C, D, E, F \geq 0$?

(b) with $A \geq 2$ $B \geq 1$ $C \geq 5$ $D \geq 0$ $E \geq 4$ and $F \geq 7$?

6. Show that $\binom{n}{k} + \binom{n}{k+1} = \binom{n+1}{k+1}$

7. Use the Iteration Method to solve the Recurrence Relation, $s_{n+1} = 7s_n - 2$ with $s_0 = 1$.

8. (a) How many initial conditions are needed to find the particular solution of the recurrence relation, $s_n = 3s_{n-1} - 5s_{n-2} + 8s_{n-4} + s_{n-5} + 28s_{n-6} - 5s_{n-18}$?

(b) Find the general solution of : $s_n = 45s_{n-2} - 4s_{n-1}$.

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

$$s_n = D(7)^n + E(9)^n, \text{ when } s_0 = -1 \text{ and } s_1 = -15 \text{ ?}$$