DISCRETE STRUCTURES - CMSC 203 - EXAM 3

NAME_____

1. (10 points) A restaurant's menu consists of 10 beverages, 12 appetizers, 9 salads, 20 entrees, 8 desserts, and 6 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. (10 points) How many ways can I arrange 30 Comedy video tapes, 25 Action tapes, 35 Drama tapes, 15 Horror tapes, and 20 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. (10 points) How many permutations are there of the words:

(a) NUMBERS **(b)** LETTERS

4. (10 points) **(a)** How many 8-bit bytes of length 10 are there?

(b) How many 8-bit bytes of length 64 are there if all the bytes must be distinct?

5. (10 points) How many integer solutions are there to: $A + B + C + D + E + F = 36$

(a) with $A, B, C, D, E, F \geq 0$? **(b)** with $A \geq 2$ $B \geq 1$ $C \geq 3$ $D \geq 0$ $E \geq 4$ and $F \geq 5$?

6. (10 points) Show that $\binom{7}{4} + \binom{7}{5} = \binom{8}{5}$

7. (15 points) Use the Iteration Method to solve the Recurrence Relation, $s_n = 5s_{n-1} + 2$ with $s_0 = 1$.

8. (25 points) **(a)** How many initial conditions are needed to find the particular solution of the recurrence relation, $s_n = 3s_{n-1} - 5s_{n-2} + 8s_{n-4} + s_{n-5} + 28s_{n-6} - 5s_{n-8}$?

(b) Find the general solution of : $s_n = 8s_{n-1} - 15s_{n-2}$.

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

$$s_n = D(5)^n + E(-7)^n, \text{ when } s_0 = 2 \text{ and } s_1 = -2 \text{ ?}$$