Assignment 5

Name:_____

Write or type solutions on a separate paper. If written, write legibly.

1. Use the multiplication and addition principles to find the count of each of the following events
   (a) If a man has 3 suits, 5 shirts, 4 ties and 2 shoes, how many outfits combinations can he wear?
   (b) If computer science has 12 types of certifications, mathematics has 5 types of certifications, and engineering has 10 types of certifications, how many certifications are available?
   (c) At a restaurant, one can choose from one (1) of two (2) dinner specials. Either choose to have 1 out of 4 appetizers, 2 out of 6 entrees and 1 out of 3 beverages; or you can choose 2 out of 6 appetizers, 1 out of 6 entrees and 2 out of 5 desserts. How many dinner combinations are possible?
   (d) How many binary strings of length 8 are palindromes?

2. Use the pigeonhole principle to find the count of each of the following events.
   (a) If k pairs of shoes are placed in a bag, how many shoes do you have to remove from the bag to guaranteed that two complete pair were removed?
   (b) How many cards must be drawn from a standard 52-card deck to guarantee a drawing a pair of club card?
   (c) If a jar contains k black marables and k white marables, how many marables must be removed to guarantee collecting $k-2$ marables of one of the colors?
   (d) Prove that in a group of 25 people that at least 3 people were born in the same month?

3. Use permutation and combination to find the count of each of the following events.
   (a) If there is a committee of 13 people, how many president-vice president pairs are possible?
   (b) From a standard deck of 52 cards, how many five card hands contain a full house (that is, three cards with the same face, and the additional cards are a pair)?
   (c) If there is a goup of 16 people, how many 3 person commitees are possible?
   (d) If a license plate consists of seven characters that can be letters or digits, how many license plates are possible with repetition? without repetition?

4. The following table shows the enrollment of freshmen students in some of STEM fields for 2018

S/G	Biology	Mathematics	Computer Science	Physics	Chemistry	Total
Men	250	300	850	700	400	2500
Women	700	450	200	550	600	2500
Total	950	750	1050	1250	1000	5000

   (a) If a student is selected at random, what is the probability of the student being a woman enrolled in physics?

   (b) If a student is selected at random, what is the probability of the student being enrolled in biology or chemistry?

   (c) If a student is selected at random, what is the probability of the student not being enrolled in computer science?

   (d) If a student is selected at random, what is the probability of the student being enrolled in computer science given that the student is a man?

5. Rewrite the program below and define the function `Perm3()` which creates a file consisting of all three letter strings without repetition on separate lines.

   You are allowed to make additional functions, but you cannot include additional libraries.

```
#include <iostream>
#include <fstream>
#include <string>
using namespace std;

int Perm3();

int main()
{
 Perm3();
 return 0;
}
```

Extra Credit A particular pregnancy test is positive 99% of the time whenever the woman is actually pregnant and 5% of the time whenever the woman is not actually pregnant. If on average 78% of women who take this test is pregnant, what is the probability that a woman is pregnant given that the test is positive?