You MUST use good notation and show appropriate work.

Math 102

(Sections 13.1-13.3)

Name _____

1. How many different license plates can be made if they must start and end with a letter and contain 3 digits between the two letters?

2. Suppose we wish to form three digit **even** numbers using only the digits from {3, 4, 5, 7, 8}. How many ways can these numbers be formed if:

   a) repetition of digits is not allowed? _____

   b) repetition of digits is allowed? _____

3. In a city election there are two candidates for mayor, five candidates for vice-mayor, seven candidates for treasurer and three candidates for secretary. In how many ways can these three offices be filled?

   _____

4. A security system has six switches, each of which can be open or closed. The state of the system is described by indicating for each switch whether it is open or closed. How many different states of the system are possible?

   _____

5. Assume a student completes an six question multiple-choice exam where each question has four possible choices. In how many different ways can a student complete the exam, if exactly one response is given to each question?

   _____

6. In how many ways can a set of five different mathematics books and three different physics books be placed on a shelf with space for eight books, if all books on the same subject are to be kept together?

   _____

7. How many different ordered arrangements can be formed on a shelf with space for four books, if there are seven different books available?

_____

8. In how many ways can 4 boys and 5 girls be seated in a row of nine seats if boys and girls are to occupy alternate seats?

_____

9. Let N = {1, 2, 3, 4, 5, 6, 7} and L = {A, B, C, D, E}

a) How many *3 digit numbers* are possible using **digits** (only) from the set N if the digits

i) can be repeated in a number? _____

ii) can not be repeated in a number? _____

b) How many *license plates* could be formed starting with a letter from the set L and followed by four digits selected from the set N if the *digits*

i) **can** be repeated on a license plate? _____

ii) **cannot** be repeated on a license plate? _____

10. Evaluate each of the following. Note: ${}_nP_r = P(n,r)$ and ${}_nC_r = C(n,r)$.

a) 0! _____

b) 5! _____

c) $\frac{7!}{5!} =$ _____

d) $\frac{9!}{10!}$ _____

e) $\frac{100!}{97!} =$ _____

f) P(7,2) = _____

g) ${}_8P_3 =$ _____

h) C(8, 3) = _____

i) ${}_8C_5 =$ _____

j) ${}_4C_2 \cdot {}_5C_3 =$ _____