Assignment 1

STAT 230
UAEU

There are a total of 7 problems. You may review Unit1 and Unit2 slides while answering the questions. Show your steps to get entire credit for your solutions.

1. Let $\mathscr{S} = \{1,2,3,4,5,6\}$, $A = \{1,2,4,6\}$, $B = \{4,5\}$, and $C = \{5,6\}$. Write down the explicit specification of the following sets
   (a) (4 points) $A \cap B$
   (b) (2 points) $A \cap B \cap C$
   (c) (4 points) $A \cup B \cup C$
   Note that $\mathscr{S}$ denotes the universal set while $\emptyset$ is the notation for the Empty-set/Nullset.

2. Supose that A and B are two events. Write experssions involving unions, interactions and complements that describe the following:
   (a) (4 points) Both events occur.
   (b) (3 points) At least one occurs.
   (c) (3 points) Neither occurs

3. (10 points) A car manufacturer provides cars with the following different variations:
   - Manual or automatic transmission
   - Two different stereo systems
   - Three possible exterior colors

   How many different variations of the car the manufacturer sells?

4. (10 points) How many different 'words' (sequences of letters that may, or may not be a dictionary word) can be constructed by permuting the letters of the word "ALMADAM"?

5. Consider 8 tosses of a coin. For example two typical sequences of outcomes that are considered different is 'HTHTTTTT', and 'HHTTTTTT'.
   (a) (5 points) What is the total number of different outcomes from the experiment?
   (b) (5 points) How many different ways there can be exactly 3 heads?

6. (10 points) An investor has 30 thousand AED to invest among 3 possible investments. Each investment must be in units of a thousand AED. If the total 30 thousand AED is to be invested, how many different investment strategies are possible?

7. If a dice is thrown 8 times and all the the 8 numbers (8-tuple) that appear are recorded. Note that there is a total of $6^8 = 1679616$ of distinct possibilities for the ordered sequences of 8 numbers (distinct 8-tuples) that can occur.
   (a) (5 points) In how many such 8-tuples, there is exactly three 6?
   (b) (5 points) In how many such 8-tuples, there is exactly three 6 and exactly two 1 ?