NOTES ON SETS

Professor Howard Sorkin hsorkin1@gmail.com

1. SET: A collection of things.
2. ELEMENT: An element is a MEMBER of a SET. It is denoted by the symbol: $\in$
   If something is NOT AN ELEMENT of a set we use the symbol: $\notin$
3. The NOTATION for sets are BRACES, { }
   Example: {Jan., Feb., Mar.} The set of the first three months of the year.
   Example: {a, e, i, o, u} The set of the vowels in the English language.
4. CAPITAL letters are used to name a set.
   Example: A = {Jan., Feb., Mar.} B = {a, e, i, o, u}
5. SUBSET: If <u>every</u> element in a given set B is also an element of a set A, then B is a SUBSET of A.
   $B \subset A$ means "B is a SUBSET of A."
   Example: If H = {1, 2, 3, 4, 5, 6} and K = {2, 4, 6} then $K \subset H$

   NOTE 1: If there is at least one element of B that is not in A then B is NOT A SUBSET of A.
   This is written $B \not\subset A$
   Example: If H = {1, 2, 3, 4, 5, 6} and M = {5, 7, 9} then $M \not\subset H$ because not ALL elements of M are in H.
   NOTE 2: Every set is a subset of itself.
6. The NULL or EMPTY SET is a set which contains NO ELEMENTS.
   The symbol for the empty set is the Greek letter *Phi*, ϕ , or we may just write { }.
7. The UNIVERSE or UNIVERSAL SET is the set which contains all the elements under discussion. The symbol for the UNIVERSAL SET is **U**
8. The COMPLEMENT of a set A is the set of all elements in the UNIVERSAL SET which are NOT in the set A. The COMPLEMENT of a set is denoted as A' and can be read as "A complement," "the complement of A," or "A prime."
   Example: If U = {a, e, i, o, u} and A = {a, i, u} then A' = {e, o}, since the elements "e" and "o" are the only elements that are NOT in A but yet are in the Universal Set U.
9. The UNION of sets A and B, $A \cup B$, is the set containing all the elements that are members of set A OR set B.
10. The INTERSECTION of two sets A and B, $A \cap B$, is the set containing all the elements that are common to BOTH sets A AND set B.

Below is an example of UNION and INTERSECTION using the following sets:

U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
A = {1, 2, 4, 6}
B = {1, 3, 6, 7, 9}
C = { }

$A \cup B$ = {1, 2, 3, 4, 6, 7, 9}
$A \cup C$ = {1, 2, 4, 6} = A
$A' \cup B$ = {1, 3, 5, 6, 7, 8, 9, 10} ..since A' = {3, 5, 7, 8, 9, 10}
$(A \cup B)'$ = {5, 8, 10}

$A \cap B$ = {1,6}
$A \cap C$ = { } = C
$A' \cap B$ = {3, 7, 9}
$(A \cap B)'$ = {2, 3, 4, 5, 7, 8, 9, 10}