M118 SECTION 7.2 – SETS

1) Set is a collection of objects

A, B, C (Capital Letters) are usually used to designate sets.

$a \in A \rightarrow$ a is an element of A
$a \notin A \rightarrow$ a is not an element of A

$\{\ \}$ **or** $\emptyset$ designates the empty set

U= universal set

$S = \{x \mid P(x)\}$ S is the set of all elements such that P(x) is true

Finite set – a set with a finite number of elements
Infinite set – a set with an infinite number of elements

$A \subset B$ (A is a subset of B) if every element of A is an element of B
$A = B$ A and B have exactly the same elements
$A \not\subset B$ A is not a subset of B
$A \neq B$ A and B do not have the exact same elements

Example: Given $A = \{0, 2, 4, 6\}$ $B = \{0, 1, 2, 3, 4, 5\ 6\}$ $C = \{2, 6, 0, 4\}$

a) $A \subset B$
b) $A \subset C$
c) $A = C$
d) $C \subset B$
e) $B \not\subset A$
f) $\emptyset \subset B$

$\emptyset$ is a subset of every set

List all the subsets of $\{a, b, c\}$

UNION: $\mathbf{A \cup B} = \{\mathbf{x} \mid x \in A \text{ or } x \in B\}$ **INTERSECTION:** $\mathbf{A \cap B} = \{\mathbf{x} \mid x \in A \text{ and } x \in B\}$

Disjoint sets: A and B are disjoint if $A \cap B = \emptyset$

COMPLEMENT of A: The complement ofA is $A' = \{x \in U | x \notin A)\}$

The complement of A is the set of all elements in the Universal set that are not also in set A.

Example: Given $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$

$A = \{3, 6, 9\}$ $B = \{3, 4, 5, 6, 7\}$ $C = \{4, 5, 7\}$

a) $A \cup B =$ _____

b) $A \cap B =$ _____

c) $A \cap C =$ _____

d) $B' =$ _____

A marketing survey of 1000 car commuters found that 600 answered yes to listening to the news, 500 answered yes to listening to music, and 300 answered yes to listening to both. Let

N = set of commuters who listen to news

M = set of commuters who listen to music

Find the number of commuters in each set:

a) $N \cap M =$ _____

b) $(N \cap M)' =$ _____

c) $N \cap M' =$ _____

d) $(N \cup M)' =$ _____

e) $N \cup M =$ _____