Tutorial 2 (Questions)

1. $A = \{2, 4, 6\}$, $B = \{2, 6\}$, $C = \{4, 6\}$, $D = \{4, 6, 8\}$. Determine if each of the following is true or false,

   a) $B \subseteq A$
   b) $C \subseteq A$
   c) $D \subseteq A$
   d) $C \subseteq B$
   e) $C \subseteq D$
   f) $B \subseteq D$

2. Use a Venn Diagram to illustrate the relationships $A \subset B \subset C$

3. $A = \{0, 2, 4, 6, 8, 10\}$, $B = \{0, 1, 2, 3, 4, 5, 6\}$, $C = \{4, 5, 6, 7, 8, 9, 10\}$. Find

a) $A \cap B \cap C$
b) $A \cup B \cup C$
c) $(A \cup B) \cap C$
d) $(A \cap B) \cup C$

4. Determine if each of the following is true or false,

a) $\emptyset \in \{\emptyset\}$
b) $\emptyset \in \{\emptyset, \{\emptyset\}\}$
c) $\{\emptyset\} \in \emptyset$
d) $\{\emptyset\} \subset \{\emptyset, \{\emptyset\}\}$

5. Let $A = \{a, b, c\}$, $B = \{x, y\}$ and $C = \{0, 1\}$. Find

a) $A \times B \times C$
b) $C \times B \times A$
c) $C \times A \times B$
d) $B \times B \times B$

6. In a class of 120 students numbered 1 to 120, all even numbered students choose Physics, whose numbers are divisible by 5 choose Chemistry and those whose numbers are divisible by 7 choose Math. How many choose none of the three subjects?

7. Of the 200 candidates who were interviewed for a position at a call centre, 100 had a two-wheeler, 70 had a credit card and 140 had a mobile phone. 40 of them had both, a two-wheeler and a credit card, 30 had both, a credit card and a mobile phone and 60 had both, a two wheeler and mobile phone and 10 had all three. How many candidates had none of the three?

8. Let A={5}. For each statement, determine if the statement is true or false.

   a. $5 \in A$
   b. 5 is a subset of A.
   c. 5 is a subset of {A}.
   d. A is a subset of {A}.
   e. {5} is a subset of A.
   f. 5 is a proper subset of A?
   g. 5 is an element {A}?
   h. A is an element of {A}.
   i. {5} is an element of A.

9. Let A = {3, 4, 7, 10, 12}. List the complete set for each of the following:

(i) $T_1 = \{x \in A : x \text{ is even}\}$
(ii) $T_2 = \{x \in A : x > 5\}$
(iii) $T_3 = \{x \in A : (x-1)^2 < 100\}$
(iv) $S_1 = \{x + 4 : x \in A\}$
(v) $S_2 = \{2x + 1 : x \in A\}$
(vi) $S_3 = \{(x-3)^2 : x \in A\}$

10. Let $A = \{a, b, c, d, e\}$, $B = \{a, b, c, d, e, f, g, h\}$. Find

(i) $A \cap B$
(ii) $A \cup B$
(iii) $A - B$
(iv) $B - A$

11. Let A be the set students who live on campus and let B be the set of students who walk to classes.

Describe the students in each of these sets.

a) $A \cap B$
b) $A \cup B$
c) $A - B$
d) $B - A$

12. Suppose A is the set of First Year Students and B is the set of students taking WXES1112. Express each of these in terms of A and B.

a) The set of First Year Students taking WXES1112.
b) The set of First Year Students who are not taking WXES1112.
c) The set of students who are either First Year Students or are taking WXES1112.
d) The set of students who either are not First Year Students or are not taking WXES1112.