Universiti Malaysia PAHANG	**COURSE: FORMAL METHODS**		**MARKS**: /100
	TOPIC: Basic Sets, Prepositions & Predicates	**CODE: BCS 2213**	
	ASSESSMENT: Tutorial 2 **NO: 2**	**DURATION: 2 Hour**	

STUDENT'S INFORMATION

MATRIC NO : _____ **Name :** _____

Instructions: Answer all the questions

1. Examine the following descriptions of sets so that you understand which members they contain (Z – is a set of all integer values). Is it true that a) corresponds to c) and b) correspond to d)? Rewrite c) and d) in more strict way.
   a. $\{-5,-3,-1,1,3,5,...\}$
   b. $\{0,2,4,6...\}$
   c. $\{n \mid m \text{ is an integer and } n = 2m\text{-}1\}$
   d. $\{n \mid n = 2m \text{ for some } m \text{ in } Z\}$

2. Write formal description of the following sets.
   a. The set containing the numbers 1, 10, 100 and 1000.
   b. The set containing all natural numbers that are less than 5.
   c. The set containing nothing at all.

For the question 3 and 4, consider the following sets.

$$EU == \left\{ \begin{matrix} Belgium, France, Germany, Italy, Luxemburg, Netherlands, Denmark, Greece, Ireland, UK, \\ Spain, Portugal \end{matrix} \right\}$$

$$NATO == \left\{ \begin{matrix} Belgium, Canada, Denmark, France, Iceland, Italy, Luxemburg, Netherlands, Norway, \\ Portugal, UK, US, Greece, Turkey, Spain, Germany \end{matrix} \right\}$$

$$Scandinavia == \{Denmark, Finland, Norway, Sweden, Iceland\}$$

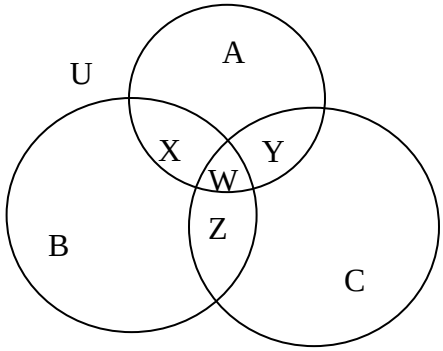
$$Benelux == \{Belgium, Netherlands, Luxemburg\}$$

$$CentralAmerica\{CostaRica, Hondarus, ElSavador, Guatemala, Nicaragua, Belize, Panama\}$$

3. Form the following sets:
   a. $Scandinavia \setminus NATO$
   b. $CentralAmerica \cap Benelux$
   c. $(EU \cap NATO) \cap Scandinavia$
   d. $EU \cap (NATO \cap Scandinavia)$

4. Supply arguments for the following rules. Illustrate the rules using sets EU, NATO and Scandinavia.
   a. $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
   b. $(A \cap B) \cup (A \setminus B) = A$

5. The diagram below is what is known as a Venn diagram. Use the letters on the diagram to describe the area corresponding to the following
   a. $A \cap (B \cup C)$
   b. $(A \cap B) \cup (A \cap C)$
   c. $(A \cup B) \setminus C$
   d. $(A \setminus C) \cup (B \setminus C)$



6. Let X be the set $\{1,2,3,4,5\}$ and Y be the set $\{6,7,8,9,10\}$. The unary function $f : X \to Y$ and the binary function $g : X \times Y \to Y$ are described as following tables.

n	***F(n)***
1	6
2	7
3	6
4	7
5	6

g	6	7	8	9	10
1	10	10	10	10	10
2	7	8	9	10	6
3	7	7	8	8	9
4	9	8	7	6	10
5	6	6	6	6	6

   a. What are value of *f*(2)?
   b. What is the range of *f*?
   c. What is the range of *g*?
   d. What is the value of *g* (2,10)?
   e. What is the value of *g* (4, *f*(4))?

7. Show that $p \Leftrightarrow q$ is equivalent to $(p \Rightarrow q) \wedge (q \Rightarrow p)$

8. Show that $\neg p \vee (p \wedge q) \Leftrightarrow \neg p \vee q$

9. How do you interpret the two sentences below, and how would you write them using the logical symbols.
   a. If it's a sunny day then we will go for a picnic
   b. If you work hard you will pass your examinations