

Basic Mathematics

Lectures 1 and 2

Solutions to Assignment 1 (25 Points)

- 1) Let the universal set $U = \{0,1,2,3,4,7,8,10,13,12,15,16,17,18,24,23,20,14, 31\}$ and its subsets A,B, and C are such that $A = \{\text{Even numbers}\}$, $B = \{\text{Prime Numbers}\}$ and $C = \{\text{Divisors of } 36\}$. List the members of the following sets;

(i) B and C (2 Points)

$$B = \{2,3,7,13,17,23,31\}; C = \{1,2,3,4,12,18\}$$

(ii) $B \cap C^c$ (2 Points)

$$\text{Complement of set } C \text{ denoted } C^c = \{0,7,8,10,13,15,16,17,24,23,20,14,31\}$$

Therefore;

$$B \cap C^c = \{2,3,7,13,17,23,31\} \cap \{0,7,8,10,13,15,16,17,24,23,20,14,31\} = \{7,13,17,23,31\}$$

(iii) $A \cap B \cap C$ (2 Points)

$$A \cap B \cap C = \{2,4,8,10,12,16,18,24,20,14\} \cap \{2,3,7,13,17,23,31\} \cap \{1,2,3,4,12,18\} = \{2\}$$

(iv) $\neg C$ (2 Points)

$$\text{This is the complement of set } C \text{ i.e. } \neg C = C^c = \{0,7,8,10,13,15,16,17,24,23,20,14,31\}$$

(v) $(A \cup B) \cap C^c$ (2 Points)

$$A \cup B = \{2,4,8,10,12,16,18,24,20,14\} \cup \{2,3,7,13,17,23,31\}$$

$$= \{2,3,7,8,10,12,13,14,16,17,18,20,23,24,31\}$$

$$(A \cup B) \cap C^c = \{2,3,7,8,10,12,13,14,16,17,18,20,23,24,31\}$$

$$\cap \{0,7,8,10,13,15,16,17,24,23,20,14,31\}$$

$$= \{7,8,10,13,14,16,17,20,23,24,31\}$$

(vi) $A \cup C$ (2 Points)

$$A \cup C = \{2,4,8,10,12,16,18,24,20,14\} \cup \{1,2,3,4,12,18\} = \{1,2,3,4,8,10,12,14,16,18,20\}$$

(vii) $A \cap C$ (2 Points)

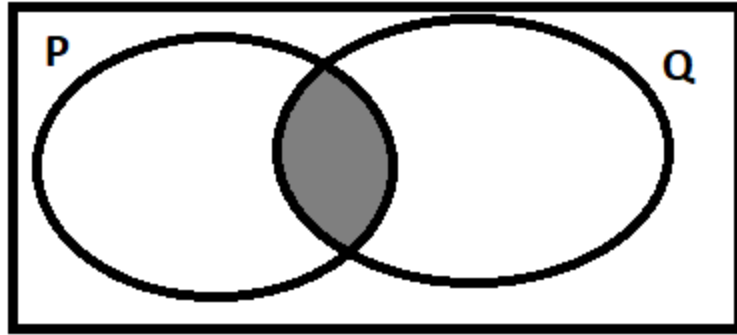
$$A \cap C = \{2,4,8,10,12,16,18,24,20,14\} \cap \{1,2,3,4,12,18\} = \{2,4,12,18\}$$

(viii) $B \cap C$ (2 Points)

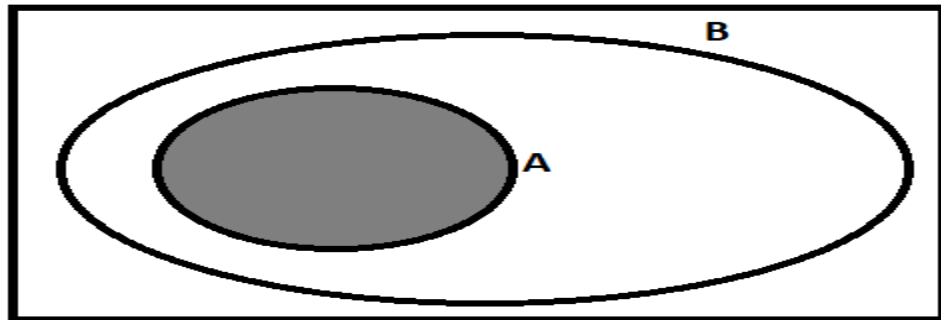
$$B \cap C = \{2,3,7,13,17,23,31\} \cap \{1,2,3,4,12,18\} = \{2, 3\}$$

- 2) Represent the following non-empty sets in separate Venn diagram, by shading the appropriate region where applicable. (Use Paint© to draw the Venn diagrams).

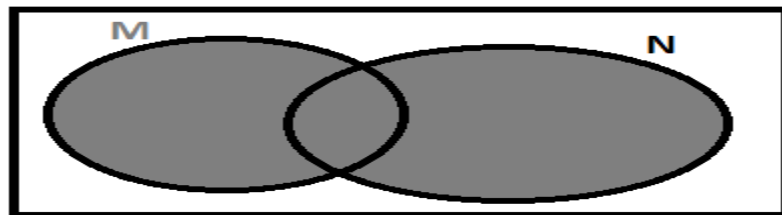
(i) $(P \cap Q)$ (2 Points)



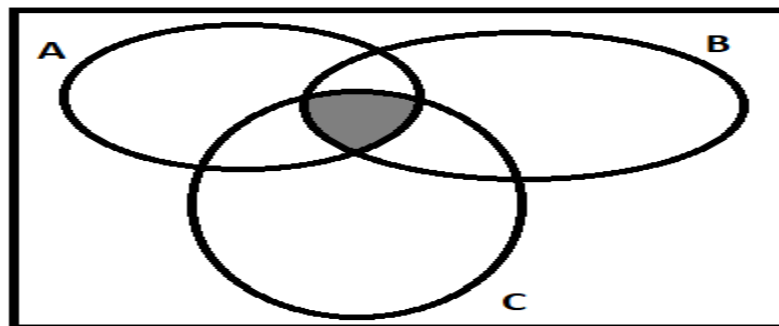
(ii) $A \subset B$ (2 Points)



(iii) $M \cup N$ (2 Points)



(iv) $A \cap B \cap C$ (2 Points)



(v) $\neg\neg\neg X = \neg X$ (2 Points)

