

Riviera International Academy

Assignment-2077

(Ashad 10, 2077, Wednesday)

Class: Nine

Subject-Computer

**Write the technical term for each of the following statements:**

- A computer that can measure physical value.
- A computer that uses discrete data.
- A computer that has the features of both analog and digital computers.
- A small computer that can be kept on lap.
- A small computer that can be kept on palm.

**Match the following**

Group 'A'

- Analog Computer
- Digital Computer
- Hybrid Computer
- Supercomputer

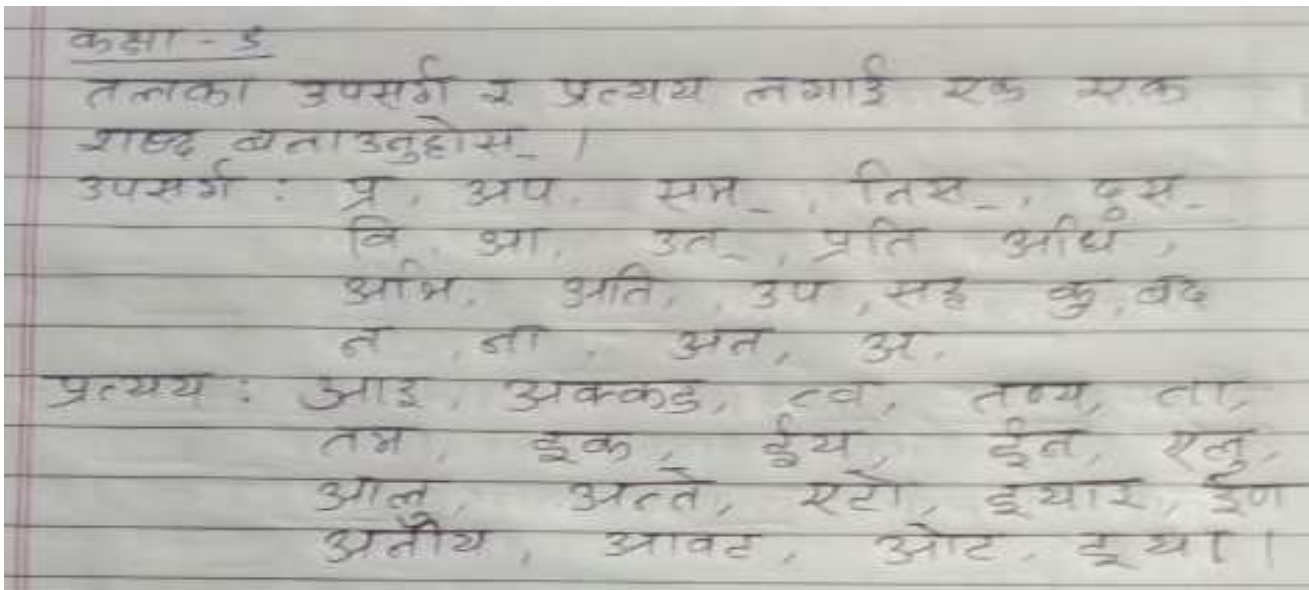
Group 'B'

- Uses discrete data
- Uses for weather forecasting
- Uses discontinuous and continuous data
- Uses at home
- Uses continuous data

**Give the full forms of the followings:**

- a. PC                      b. IBM                      c. PDA                      d. ECG

विषय - नेपाली



**Subject- Mathematics**

Source: Photos of exercise are given below.

**2. Intersection of sets**

Let's take any two sets P and Q, where  $P = \{2, 4, 6, 8\}$  and  $Q = \{4, 8, 12, 16\}$ . Now, the intersection of sets P and Q denoted as  $P \cap Q = \{4, 8\}$ . Thus, the intersection of two or more sets is made just by listing their common element/s in a separate set.

The intersection of two sets P and Q denoted by  $P \cap Q$  is the set of the elements which are common to both the sets.

In set-builder form, intersection of sets P and Q is defined as:  
 $P \cap Q = \{x : x \in P \text{ and } x \in Q\}$

The shaded regions in the following Venn-diagrams represent the intersection of sets.

**Difference of sets**

Let  $A = \{1, 2, 3, 4, 5\}$  and  $B = \{2, 3, 5, 7, 11\}$  be any two sets. Then, the difference between the sets A and B denoted as  $A - B = \{1, 4\}$ . Also, the difference between the sets B and A denoted as  $B - A = \{7, 11\}$ . Thus, the difference of two sets A and B denoted by  $A - B$  is the set of the elements of only A which do not belong to B. Similarly, the difference of two sets B and A denoted by  $B - A$  is the set of the elements of only B which do not belong to A.

In set-builder form, the difference of sets A and B is defined as:  
 $A - B = \{x : x \in A, \text{ but } x \notin B\}$

Also, the difference of sets B and A is defined as:  
 $B - A = \{x : x \in B, \text{ but } x \notin A\}$

In this way,  
 $A - B = A - (A \cap B)$  ← Removing the common elements from A  
 $B - A = B - (A \cap B)$  ← Removing the common elements from B

The shaded regions in the following Venn-diagrams represent the difference of the given sets.

**(iv) Complement of a set**

Let  $A = \{1, 3, 5, 7, 9\}$  be a subset of a universal set  $U = \{1, 2, 3, \dots, 10\}$ . Then, the complement of the set A denoted as  $\bar{A} = \{2, 4, 6, 8, 10\}$ . Thus, the complement of set A is the difference of U and A. The complement of set A can also be denoted by  $A'$  or  $A^c$ .

In this way, if A be a subset of a universal set U, then the complement of A denoted by  $\bar{A}$ ,  $A'$ ,  $A^c$  is the set of the elements of U which do not belong to the set A.

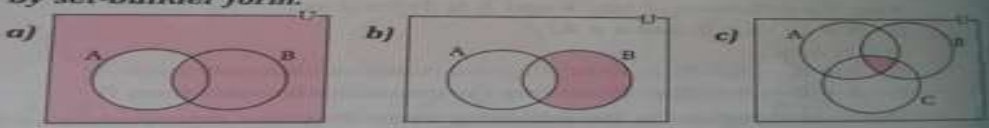
In set-builder form, the complement of a set A is defined as:  
 $\bar{A} = \{x : x \in U, \text{ but } x \notin A\}$  which is  $U - A$ .

Similarly, the set builder forms of the complements of union and intersection of set A and set B are:  
 $\overline{A \cup B} = \{x : x \in U, \text{ but } x \notin A \text{ or } x \notin B\}$  or,  $\{x : x \in U, \text{ but } x \notin A \cup B\}$   
 $\overline{A \cap B} = \{x : x \in U, \text{ but } x \notin A \text{ and } x \notin B\}$  or,  $\{x : x \in U, \text{ but } x \notin A \cap B\}$

The shaded regions in the following Venn-diagrams represent the complement of the given sets.

**Worked-out examples**

**Example 1:** Let A, B and C are the subsets of a universal set U. Write the set operations represented by the shaded regions. Define each operation by set-builder form.



**Solution:**

i) The non-shaded region is  $A - B$ . So, the shaded region is  $\overline{A - B} = \{x : x \in U, \text{ but } x \notin A - B\}$

ii) The shaded region is  $B - A = \{x : x \in B, \text{ but } x \notin A\}$

iii) The shaded region is  $A \cap B \cap C = \{x : x \in A, x \in B \text{ and } x \in C\}$

**Example 2:** Let  $A = \{2, 4, 6, 8, 10\}$  and  $B = \{2, 3, 5, 7\}$  are the subsets of the universal set of  $U = \{1, 2, 3, 4, \dots, 10\}$ . Compute the following set operations with Venn-diagrams.

(i)  $A \cup B$  and  $\overline{A \cap B}$

(ii)  $A \cap B$  and  $\overline{A \cup B}$

(iii)  $A - B$  and  $\overline{A - B}$

(iv)  $B - A$  and  $\overline{B - A}$

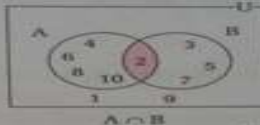
**Solution:**

Here,  $A = \{2, 4, 6, 8, 10\}$ ,  $B = \{2, 3, 5, 7\}$  and  $U = \{1, 2, 3, 4, \dots, 10\}$

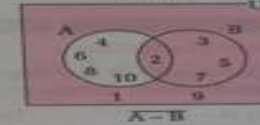
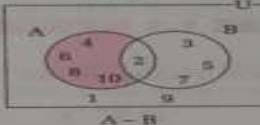
(i)  $A \cup B = \{2, 3, 4, 5, 6, 7, 8, 10\}$   
 $\overline{A \cap B} = U - (A \cap B)$   
 $= \{1, 9\}$



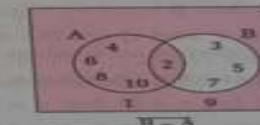
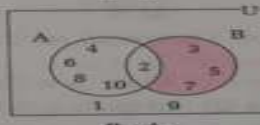
(ii)  $A \cap B = \{2\}$   
 $\overline{A \cup B} = U - (A \cup B)$   
 $= \{1, 3, 4, 5, 6, 7, 8, 9, 10\}$



(iii)  $A - B = A - (A \cap B)$   
 $= \{4, 6, 8, 10\}$   
 $\overline{A - B} = U - (A - B)$   
 $= \{1, 2, 3, 5, 7, 9\}$



(iv)  $B - A = B - (A \cap B)$   
 $= \{3, 5, 7\}$   
 $\overline{B - A} = U - (B - A)$   
 $= \{1, 2, 4, 6, 8, 9, 10\}$

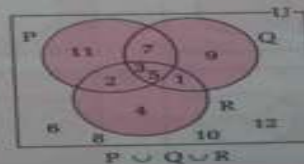


**Example 3:** P, Q and R are the subsets of the universal set U. If  $U = \{1, 2, 3, \dots, 12\}$ ,  $P = \{2, 3, 5, 7, 11\}$ ,  $Q = \{1, 3, 5, 7, 9\}$ , and  $R = \{1, 2, 3, 4, 5\}$ , find  
 a)  $P \cup Q \cup R$     b)  $P \cap Q \cap R$     c)  $(P \cap Q) \cup R$     d)  $(P \cup Q) \cap R$

**Solution:**

Here,  $U = \{1, 2, 3, \dots, 12\}$   
 $P = \{2, 3, 5, 7, 11\}$   
 $Q = \{1, 3, 5, 7, 9\}$  and  
 $R = \{1, 2, 3, 4, 5\}$

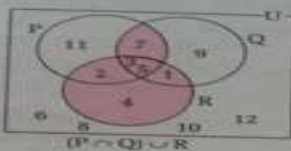
a)  $P \cup Q = \{1, 2, 3, 5, 7, 9, 11\}$   
 $P \cup Q \cup R = \{1, 2, 3, 4, 5, 7, 9, 11\}$



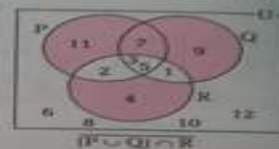
b)  $P \cap Q = \{3, 5, 7\}$   
 $P \cap Q \cap R = \{3, 5\}$



c)  $P \cap Q = \{3, 5, 7\}$   
 $(P \cap Q) \cup R = \{1, 2, 3, 4, 5, 7\}$



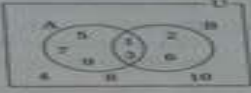
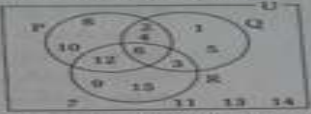
d)  $P \cup Q = \{1, 2, 3, 5, 7, 9, 11\}$   
 $(P \cup Q) \cap R = \{1, 2, 3, 5\}$   
 $(P \cup Q) \cap R = \{4, 6, 7, 8, 9, 10, 11, 12\}$



**EXERCISE 1.1**

**General section**

- Let A and B be the subsets of a universal set U. Define the following set operations in set-builder forms.
  - $A - B$
  - $A \cap B$
  - $\overline{B - A}$
  - $A \cup B$
  - $\overline{A - B}$
  - $\overline{A \cup B}$
  - $B - A$
  - $\overline{A}$
  - $\overline{B}$
  - $\overline{A \cap B}$
- Let P and Q are the subsets of a universal set U. Write the set operations defined by the following set-builder forms.
  - $\{x : x \in Q, \text{ but } x \notin P\}$
  - $\{x : x \in U, \text{ but } x \notin Q\}$
  - $\{x : x \in P \text{ or } x \in Q\}$
  - $\{x : x \in U, \text{ but } x \notin P \text{ or } x \notin Q\}$
  - $\{x : x \in P, \text{ but } x \notin Q\}$
  - $\{x : x \in P \text{ and } x \in Q\}$
  - $\{x : x \in U, \text{ but } x \notin P - Q\}$
  - $\{x : x \in U, \text{ but } x \notin P \text{ and } x \notin Q\}$
  - $\{x : x \in U, \text{ but } x \notin P\}$
- Write the set operations represented by shaded regions shown in the following Venn-diagrams.
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4. a) A and B are the subsets of the universal set U. From the given diagrams, list the elements of the following set operations.
- (i)  $A \cup B$  and  $\overline{A \cap B}$       (ii)  $A \cap B$  and  $\overline{A \cap B}$   
 (iii)  $A - B$  and  $\overline{A - B}$       (iv)  $B - A$  and  $\overline{B - A}$
- 
- b) P, Q and R are the subsets of the universal set U. List the elements of the following set operations from the given diagram.
- (i)  $P \cup Q \cup R$       (ii)  $P \cap Q \cap R$       (iii)  $\overline{P \cup Q \cup R}$   
 (iv)  $\overline{P \cap Q \cap R}$       (v)  $(P \cup Q) \cap R$       (vi)  $(P \cap Q) \cup R$
- 
5. a) Assuming that A and B are two overlapping sets, draw two separate Venn-diagrams to verify  $A \cup B = B \cup (A - B)$  by shading.  
 b) Let P and Q are two overlapping sets. Draw two separate Venn-diagrams of  $P \cup (Q - P)$  and  $P \cup Q$  and verify  $P \cup (Q - P) = P \cup Q$  by shading.

**Creative section - A**

6. P and Q are the subsets of the universal set U. If  $U = \{1, 2, 3, \dots, 10\}$ ,  $P = \{1, 2, 3, 4, 5\}$  and  $Q = \{2, 4, 6, 8\}$ , list the elements of the following set operations and represent them by shading in Venn-diagrams.
- a)  $P \cup Q$  and  $\overline{P \cup Q}$       b)  $P \cap Q$  and  $\overline{P \cap Q}$       c)  $P - Q$  and  $\overline{P - Q}$   
 d)  $Q - P$  and  $\overline{Q - P}$       e)  $\overline{P \cup Q}$       f)  $P \cap Q$
7.  $A = \{1, 3, 5, 7, 9, 11\}$ ,  $B = \{1, 2, 3, 4, 5, 6, 7\}$  and  $C = \{3, 6, 9, 12, 15\}$  are the subsets of the universal set  $U = \{1, 2, 3, \dots, 15\}$ . List the elements of the following set operations and illustrate them in Venn-diagrams by shading.
- a)  $A \cup B \cup C$  and  $\overline{A \cup B \cup C}$       b)  $A \cap B \cap C$  and  $\overline{A \cap B \cap C}$   
 c)  $(A \cup B) \cap C$  and  $\overline{(A \cup B) \cap C}$       d)  $A \cap (B \cup C)$  and  $\overline{A \cap (B \cup C)}$   
 e)  $(A - B) \cup C$  and  $\overline{(A - B) \cup C}$       f)  $A \cup (B - C)$  and  $\overline{A \cup (B - C)}$

**Creative section - B**

8. If  $U = \{1, 2, 3, \dots, 12\}$ ,  $P = \{1, 2, 3, 4, 5, 6\}$ ,  $Q = \{2, 4, 6, 8\}$  and  $R = \{3, 6, 9, 12\}$ , verify the following operations.
- a)  $P \cup (Q \cap R) = (P \cup Q) \cap (P \cup R)$       b)  $P \cap (Q \cup R) = (P \cap Q) \cup (P \cap R)$   
 c)  $P \cup Q = P \cap Q$       d)  $\overline{P \cap Q \cap R} = P \cup Q \cup R$
9. a) If  $A = \{2, 4, 6, 8, 10\}$  and  $B = \{1, 3, 5, 7, 9\}$  are two disjoint sets verify that  $n(A \cup B) = n(A) + n(B)$ .  
 b) If  $A = \{2, 3, 5, 7\}$  and  $B = \{1, 2, 3, 4, 6, 12\}$  are two overlapping sets, show that  $n(A \cup B) = n(A) + n(B) - n(A \cap B)$ .

**1.9 Cardinality relationships of two sets**

The cardinality of a set is a measure of the number of members of the set. For example, the set  $A = \{1, 3, 5, 7, 9\}$  contains 5 members, and therefore A has a cardinality of 5. The number of members of a set is called its cardinality. Certain relationships can be generalised by taking the cardinalities of different sets.

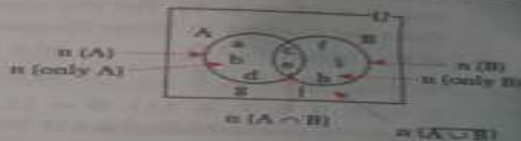
**(i) Cardinality relations of union of two disjoint sets**

Let  $U = \{a, b, c, d, e, f, g, h, i\}$  is a universal set.  $A = \{a, b, c, d\}$  and  $B = \{e, f, g, h, i\}$  are the subsets of U.  
 Now,  $A \cup B = \{a, b, c, d, e, f, g, h, i\}$   
 Here,  $n(U) = 10$ ,  $n(A) = 4$  and  $n(B) = 5$   
 Now,  $n(A \cup B) = 9 = 4 + 5 = n(A) + n(B)$   
 Also,  $n(\overline{A \cup B}) = 1 = 10 - 9 = n(U) - n(A \cup B)$   
 Thus, if A and B are any two disjoint subsets of a universal set U, then  
 $n(A \cup B) = n(A) + n(B)$   
 $n(\overline{A \cup B}) = n(U) - n(A \cup B)$



**(ii) Cardinality relations of union of two overlapping sets**

Let  $A = \{a, b, c, d, e\}$  and  $B = \{c, h, i, e, f\}$  are two subsets of a universal set  $U = \{a, b, c, d, e, f, g, h, i, j\}$   
 Now,  $A \cup B = \{a, b, c, d, e, f, h, i\}$   
 $A \cap B = \{c, e\}$   
 $\overline{A \cup B} = \{g, j\}$   
 only A =  $n_o(A) = \{a, b, d\}$   
 only B =  $n_o(B) = \{f, h, i\}$



Here,  $n(U) = 10$ ,  $n(A) = 5$ ,  $n(B) = 5$  and  $n(A \cap B) = 2$   
 Now,  $n(A \cup B) = 8 = 5 + 5 - 2 = n(A) + n(B) - n(A \cap B)$   
 Also,  $n(\overline{A \cup B}) = 2 = 10 - 8 = n(U) - n(A \cup B)$   
 Again,  $n(\text{only A}) = n_o(A) = 3 = 5 - 2 = n(A) - n(A \cap B)$   
 $n(\text{only B}) = n_o(B) = 3 = 5 - 2 = n(B) - n(A \cap B)$

Thus, if A and B are any two overlapping subsets of a universal set U,  
 $n(A \cup B) = n(A) + n(B) - n(A \cap B)$   
 $n(\overline{A \cup B}) = n(U) - n(A \cup B)$   
 $n(A \cap B) = n(A) + n(B) - n(A \cup B)$   
 $n(\text{only A}) = n_o(A) = n(A) - n(A \cap B)$   
 $n(\text{only B}) = n_o(B) = n(B) - n(A \cap B)$   
 Furthermore, if the universal set U contains only the members of A and B, then,  $n(\overline{A \cup B}) = 0$  and  $n(U) = n(A \cup B)$

Work:

- Read & write all the definitions.
- Copy all the examples.

Do your work neatly.

**Subject- HPE**

1. What are the factors affecting birth? Explain in details.
2. What are the factors affecting death? List the points and explain each of them.

**The End.**