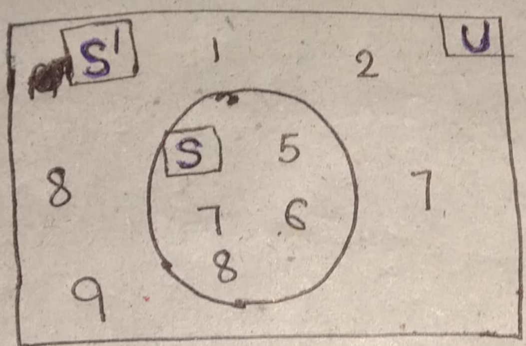
Week-2 challenge :-

1) **Given :-**

$S = \{5, 6, 3, 4\}$

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

then, $S' = \{1, 2, 7, 8, 9\}$



To find :-

1) $n(S)$ 2) $n(S')$, 3) $n(S) + n(S') = n(U)$

Soln:-

1) $n(S) = 4$ ($\because$ 4 elements in Set S, n(S))

2) $n(S') = 5$ ($\because$ 5 elements in Set S', n(S'))

3) $n(S) + n(S') = n(U)$

$\{n(U) = 9\}$

$\Rightarrow 4 + 5 = 9$

$\Rightarrow 9 = 9$

Hence proved // $n(S) + n(S') = n(U)$

2) Set ~~of~~ Vowels, $S = \{a, e, i, o, u\}$

3) Given :-

$A = \{5, 7, 8, 9\}$

$B = \{3, 4, 5, 6\}$

$C = \{2, 4, 6, 8, 10\}$

To find :-

a) $n(A) + n(B)$

$\Rightarrow n(A) = 4$ {∵ 4 elements in Set A}

$\Rightarrow n(B) = 4$ {∵ 4 elements in set B}

$\Rightarrow n(A) + n(B) = 4 + 4$

$\Rightarrow n(A) + n(B) = 8$

b) $n(A \cup B)$

$\Rightarrow A \cup B = \{3, 4, 5, 6, 7, 8, 9\}$

$\Rightarrow n(A \cup B) = 7$ (7 distinct elements in A and B)

c) $n(A \cap B)$:-

$A \cap B = \{5\}$

$\Rightarrow n(A \cap B) = 1$ (1 distinct element in $(A \cap B)$)

d) $n(A \cup B) + n(A \cap B)$

WKT:-

* $n(A \cup B) = 7$
* $n(A \cap B) = 1$

then, $n(A \cup B) + n(A \cap B) = 7 + 1$

$= 8$ //

e) $n(B) + n(C) - n(B \cap C)$

WKT:-

$n(B) = 4$

$n(C) = 5$

Soln:-

$\Rightarrow (B \cap C) = \{4, 6\}$

$\Rightarrow n(B \cap C) = 2$ ∵ (2 elements in $(B \cap C)$)

Therefore:-

$n(B) + n(C) - n(B \cap C) = 4 + 5 - 2$

$\boxed{n(B) + n(C) - n(B \cap C) = 7}$ //

f) $n(A) + n(B) = n(A \cup B) + n(A \cap B)$

~~WKT~~ WKT:-

LHS:-

$n(A) + n(B) = 8$

$8 = 8$ //

RHS:-

$n(A \cup B) + n(A \cap B) = 7 + 1 = 8$ //

LHS = RHS

$n(A) + n(B) = n(A \cup B) + n(A \cap B)$ // Hence proved -

3) $n(B \cup C) = n(B) + n(C) - n(B \cap C)$

WKT:-

Soln:-

~~$\Rightarrow 2 = 4 + 5 - 2$~~

LHS $(B \cup C) = \{3, 4, 5, 6, 2, 8, 10\}$

$n(B \cup C) = 7$ (7 elements in $(B \cup C)$)

we already know that,

RHS $n(B) + n(C) - n(B \cap C) = 7$ //

LHS = RHS //

$n(B \cup C) = n(B) + n(C) - n(B \cap C)$ //

Hence proved

4) Soln:-

The set can be written as,

$\{x \mid$ (x is an American citizen) OR (x holds a proper VISA) OR (x is a government official with diplomatic passport$\}$.

5) a) $3 \in Z$ ⟶ True (Z → Set of integers)

b) $5+4i \in Q$ ⟶ False (Q → rational number, but i is complex number)

c) $5i \in C$ ⟶ True (C → Complex number)

d) $-2 \in$ ⟶ True (real number)

e) $2 \in$ ⟶ ~~False~~ True (real number)

6) Set, S = { COD, Credit Card, Debit Card, UPI }

7) a) A: (factors of 20) :-

⇒ factors of 20 = {1, 2, 4, 5, 10, 20} = 6//

This Set is Countable (finite set)

b) B: (all Squares) :-

⇒ B: (all Squares) = {1, 4, 9, 16, 25, 36, ..., n}

This Set is Countable. (infinite Set)

c) $C = \{x : x \in Z, -5 < x < 10\}$:-

⇒ $C = \{x : x \in Z, -5 < x < 10\} = \{-4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$

no. of elements = 14

This Set is Countable (finite Set)

e) E: {all the prime no.'s} :-

E: {2, 3, 5, 7, 11, 13, 17, 19, ... n}

This set is Countable (infinite set)

d) D: {prime no. less than 20} :-

D: {2, 3, 5, 7, 11, 13, 17, 19} = 8

This set is Countable (finite set)

f) F: {all irrational no.'s} :-

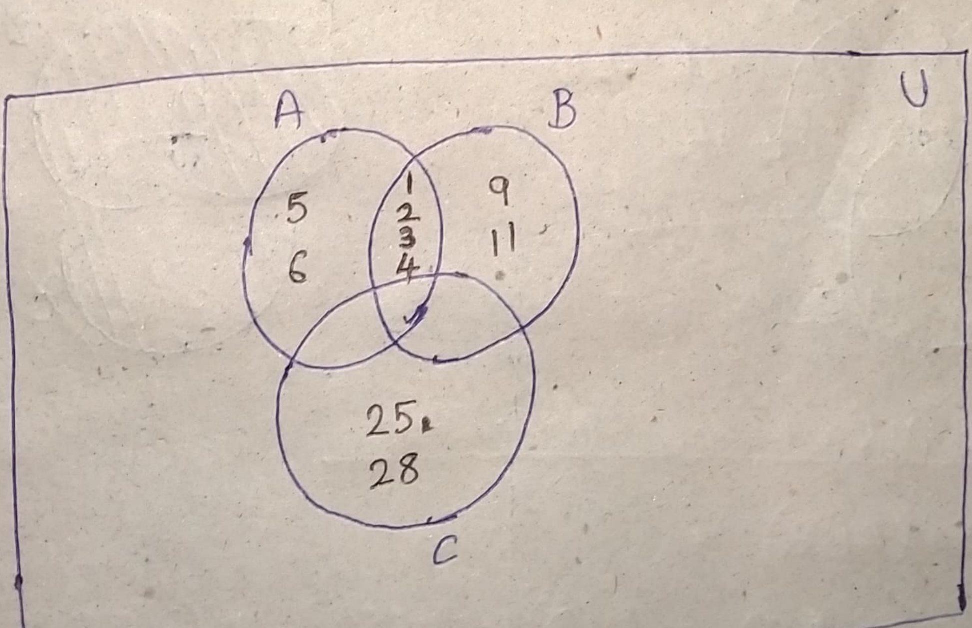
F: {all irrational no.'s} = {π, $\sqrt{2}$, ... n}

This set is Uncountable (infinite set)

g) G = {x : x ∈, -5 < x < 10} :-

This is uncountable set (infinite set)

8)



A = {1, 2, 3, 4, 5, 6}

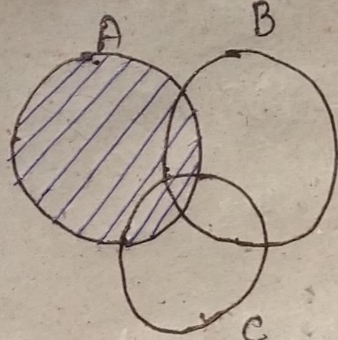
B = {1, 2, 3, 4, 9, 11}

C = {25, 28}

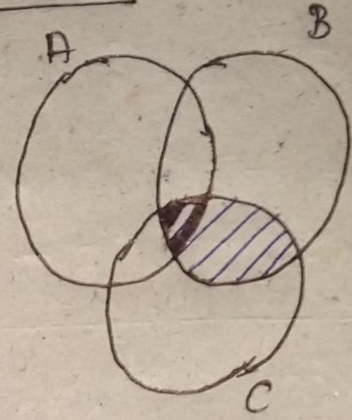
(A∪B) = {1, 2, 3, 4, 5, 6, 9, 11}

(A∩B) = {1, 2, 3, 4}

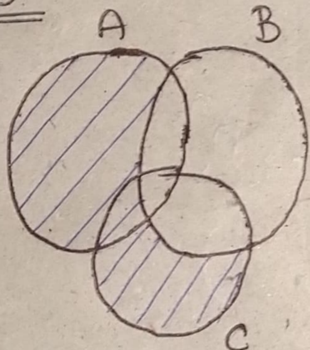
9) a) A



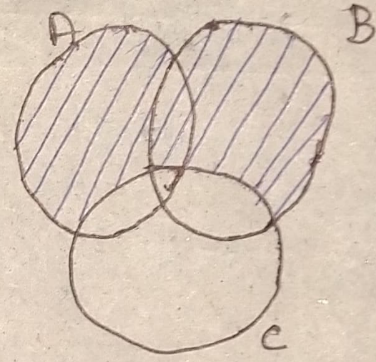
b) $B \cap C$



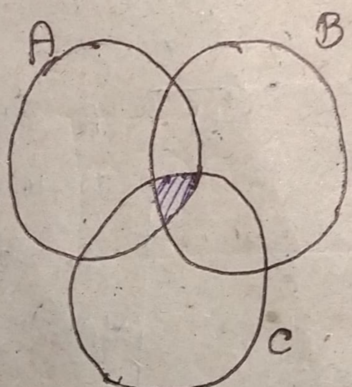
c) B'



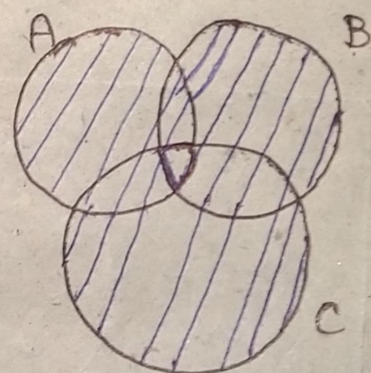
D) $A \cup B$:-



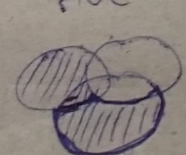
e) $A \cap B \cap C$:-

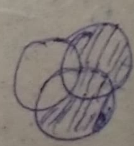


f) $(A \cap B \cap C)'$

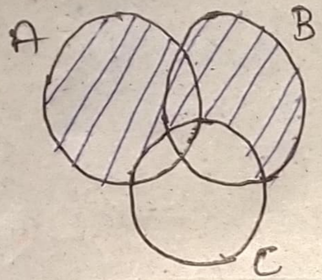


$A \cup C$

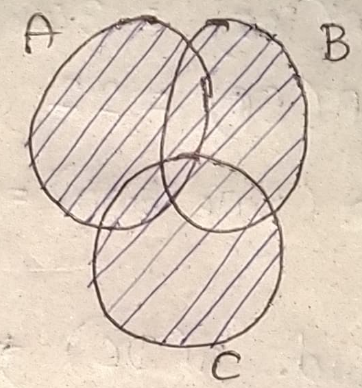




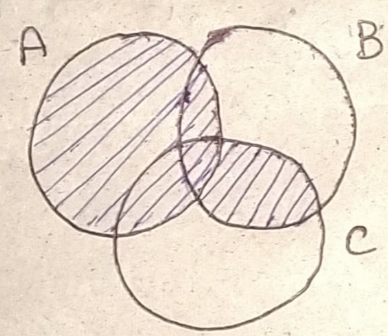
g) $A \cup B$:-



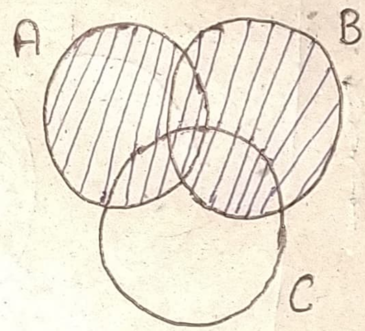
h) $A \cup B \cup C$:-



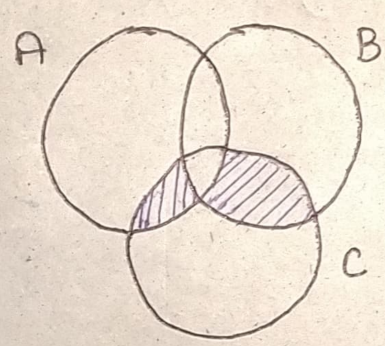
i) $(B \cap C) \cup A$:-



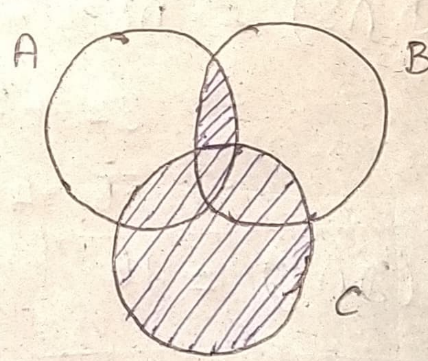
j) $(A \cup B) \cap C$:-



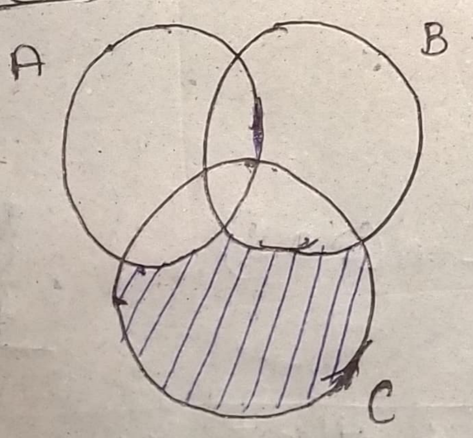
k) $(A \cap C) \cup (B \cap C)$:-



l) $(A \cap B) \cup C$:-



m) $(A \cup C) \cap (B \cup C)$:-



10) $n(D \cup S) = 40$

$n(D) = 34$

$n(S) = 22$

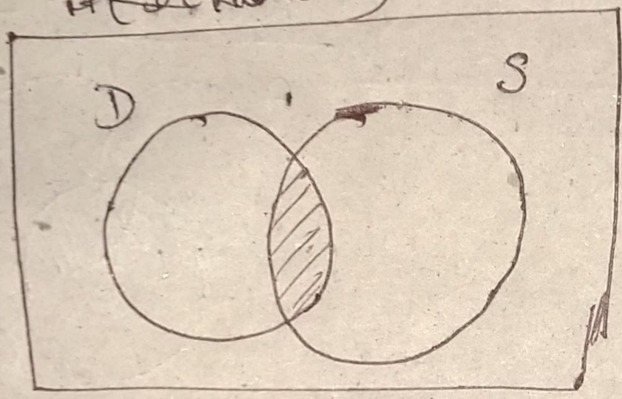
$n(\text{hate both}) = 2$

$56 - 40 = 16$

Soln:-

a) To find $n(DC)$, $n(SC)$

∴ ~~n(DC∩SC)~~



who ate both

$$n(D \cap S) = n(D) + n(S) - n(D \cup S)$$
$$= 34 + 22 - 40$$
$$= 56 - 40$$
$$\boxed{n(D \cap S) = 16}$$

∴ 16 Students eat both the Chocolates //

b) Atleast one chocolates :-

$\Rightarrow n(A \cup B)$

$$n(D \cup S) = n(D) + n(S) - n(D \cap S)$$
$$= 34 + 22 - 16$$

$56 - 16 = 40$

$n(D \cup S) = 40$ students eat atleast one ~~chola~~ chocolates