Subset

IF every element of A is also an element of B
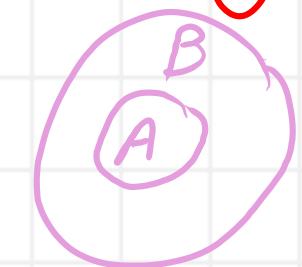
$$X \in A, \text{ then } X \in B$$

We say B is subset of A

$$A \subseteq B$$

Venn Diagram

or
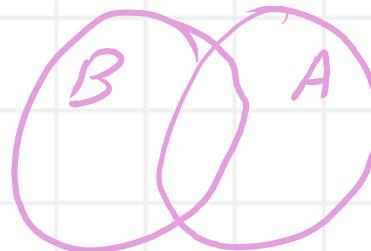
Not a subset of B

or $B \supseteq A$

Subsets Suppose every element in a set A is also an element of a set B, that is, suppose a ∈ A implies a ∈ B. Then A is called a subset of B.

We also say that A is contained in B or that B contains A. This relationship is written A ⊆ B or B ⊇ A

Example - 5

Let A = { 1, 2, 3, 4, 5, 6 }, B = { 2, 4, 5 }, C = { 1, 2, 3, 4, 5 }

Solution

$$B \subset C \text{ and } C \subseteq A$$

Venn

1 2
3 4
5 6
A

2
5 4
B

1 2
3 4 5
C

A
C
B
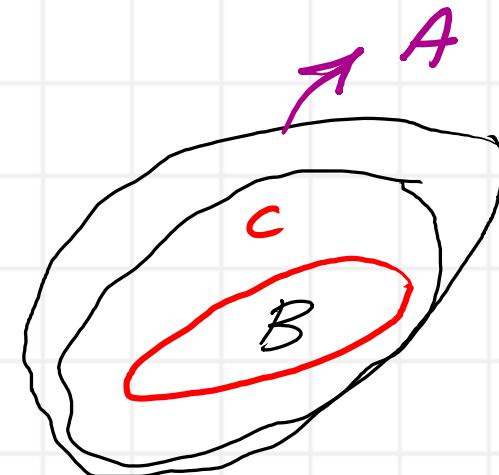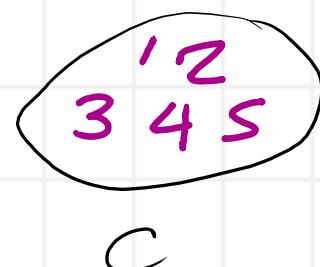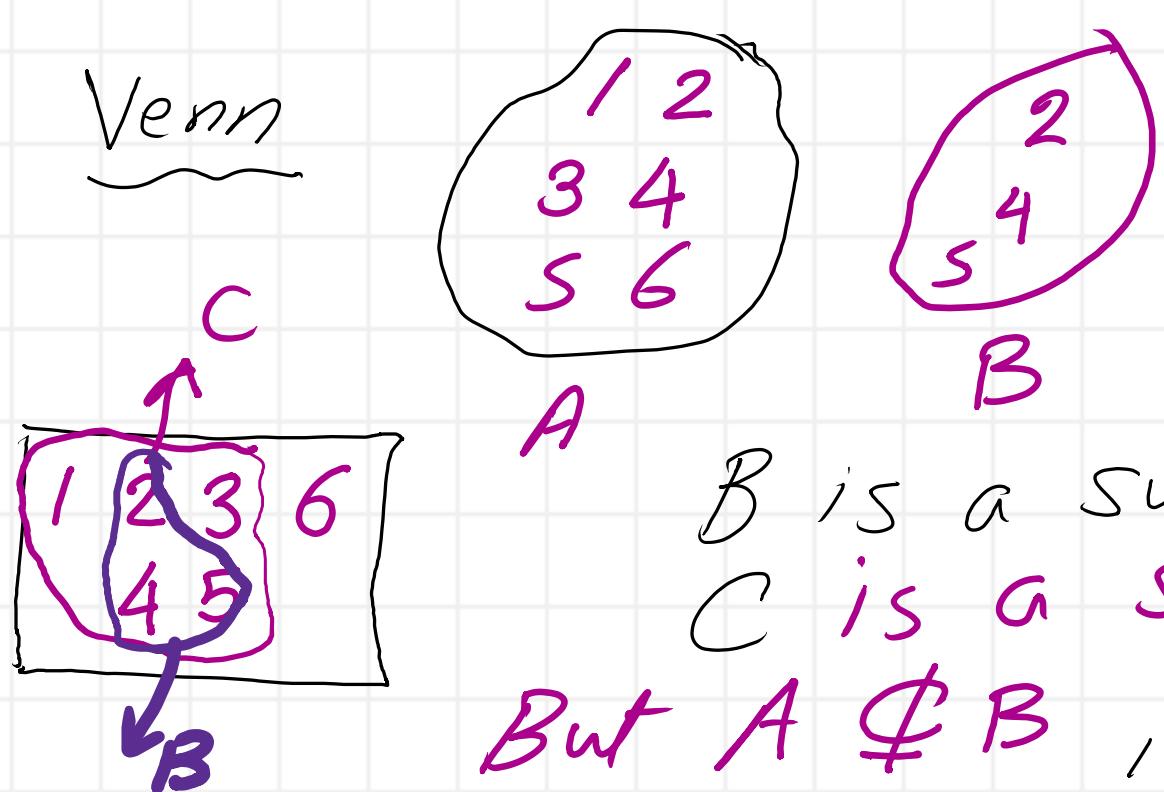
B is a subset of C
C is a subset of A
But A $\not\subset$ B, C $\not\subset$ B and A $\not\subset$ C

C
1 2 3 6
4 5
B

Example - 6

Let $A = \{1, 2, 3, 4\}$, $B = \{1, 4\}$, $C = \{1\}$

Describe which is a subset.

solution

Subsets : $B \subseteq A$
$C \subseteq B$, $C \subseteq A$ } Three subsets

But $A \not\subseteq B$, $B \not\subseteq C$, $A \not\subseteq C$

B is a subset of A, C is a subset of B

C is a subset of A

Fact $\Longrightarrow$ The empty set Ø is also regarded as a subset of every other set.

Example #7 Let $M = \{\{a,b,c\}\}$. How many subsets do we have?

We have Four subsets $\{a\}, \{b\}, \{c\}, \{\phi\}$

Example #8 : How many Subsets of M, iF M has $\{a\}, \{b\}, \{a,b,c\}$

Solution : There are 8 subsets
$\{a\}, \{b\}, \{a,b\}, \{b,c\}, \{a,b,c\}$
$\{c\}, \{\phi\}, \{a,c\}$

Universal Set

The Universal set U For any particular problem is the set which contains all the possible elements of the problem.

$$\boxed{ U }$$
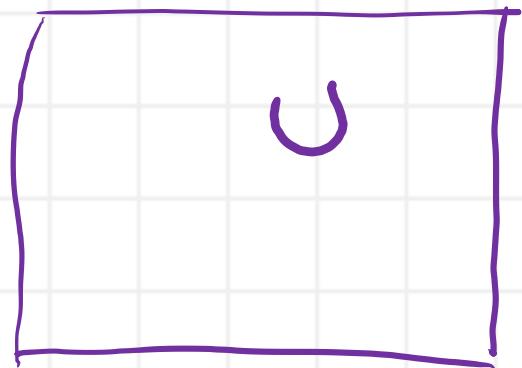
Example #9   **Draw the Venn diagram to**
represent the following sets

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

$A = \{1, 2, 5, 6\}$

$B = \{3, 9\}$

Answer

A

1 2 5
6

B

3 9

U

1 2 3 4
5 6 7 8
9

$\Rightarrow$

U

1 2 A 4
5 6   3 B
7   9
   8