

# SETS NOTES

## Subsets

If  $A = \{1, 2, 3, 4\}$  and  $B = \{3, 4\}$

All the elements in  $B$  are also in  $A$ .

So  $B$  is a subset of  $A$ .

Symbol  $\subset$  "long C or sideways u."

$\therefore B \subset A$

Not a subset symbol:  $\not\subset$

Eg) If  $A = \{a, b, c\}$

The subsets of  $A$  with just one element

$\{a\}, \{b\}, \{c\}$

The subsets of  $A$  with two elements

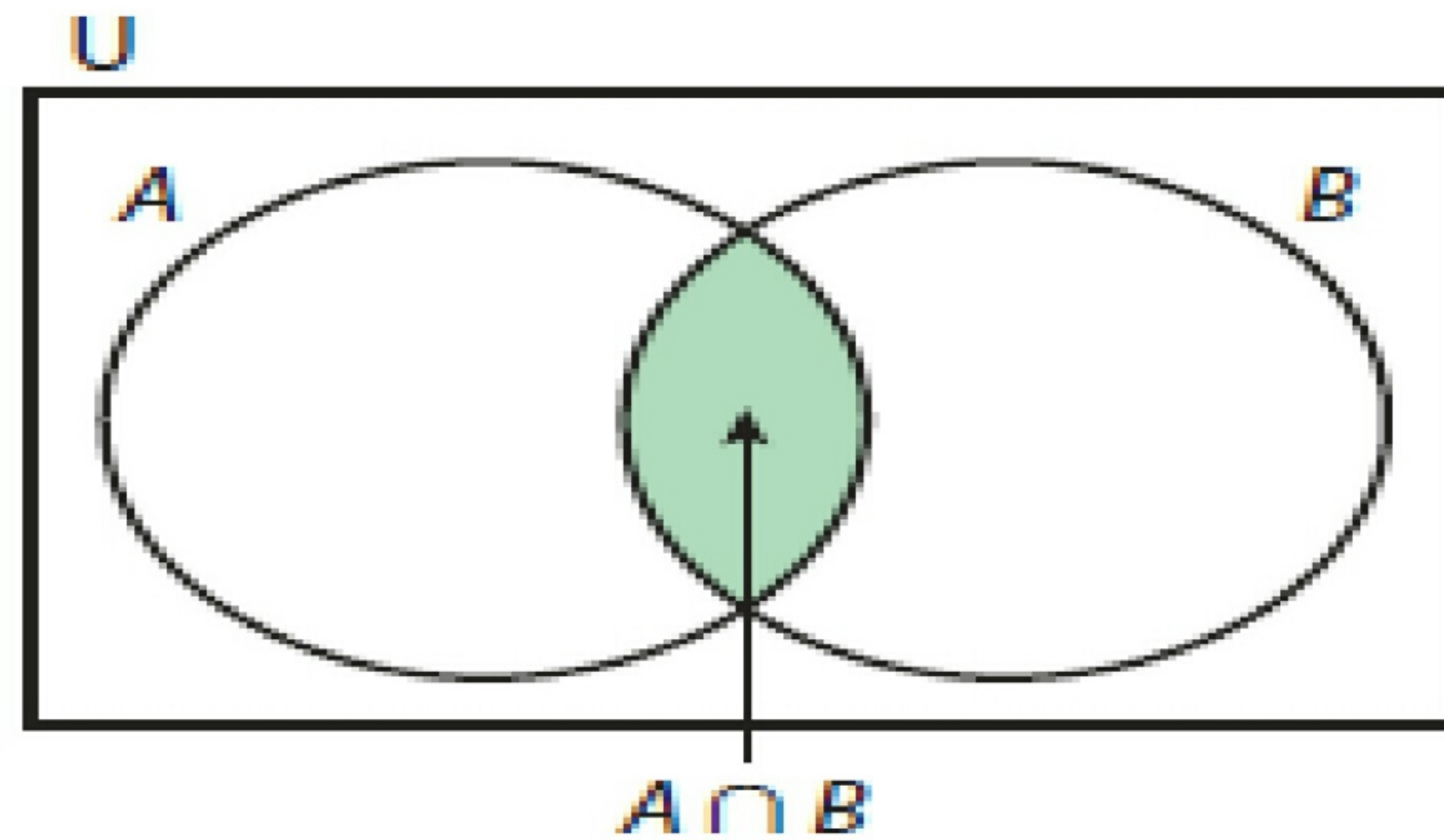
$\{a, b\}, \{b, c\}, \{a, c\}$

} Proper  
Subsets

Improper subsets  $\rightarrow A = \{a, b, c\}$

The null set  $\{\}$  or  $\emptyset$

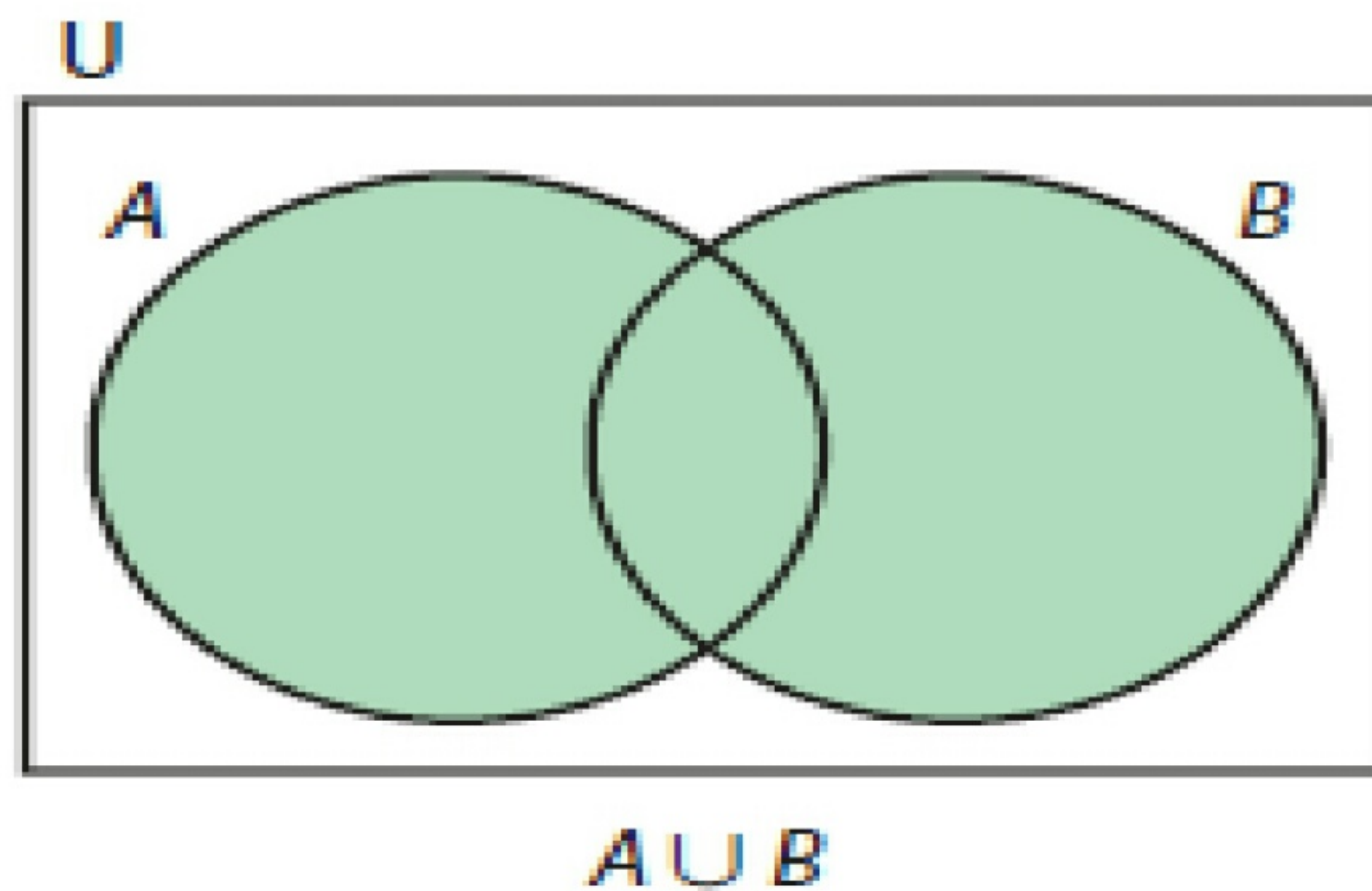
# Intersection



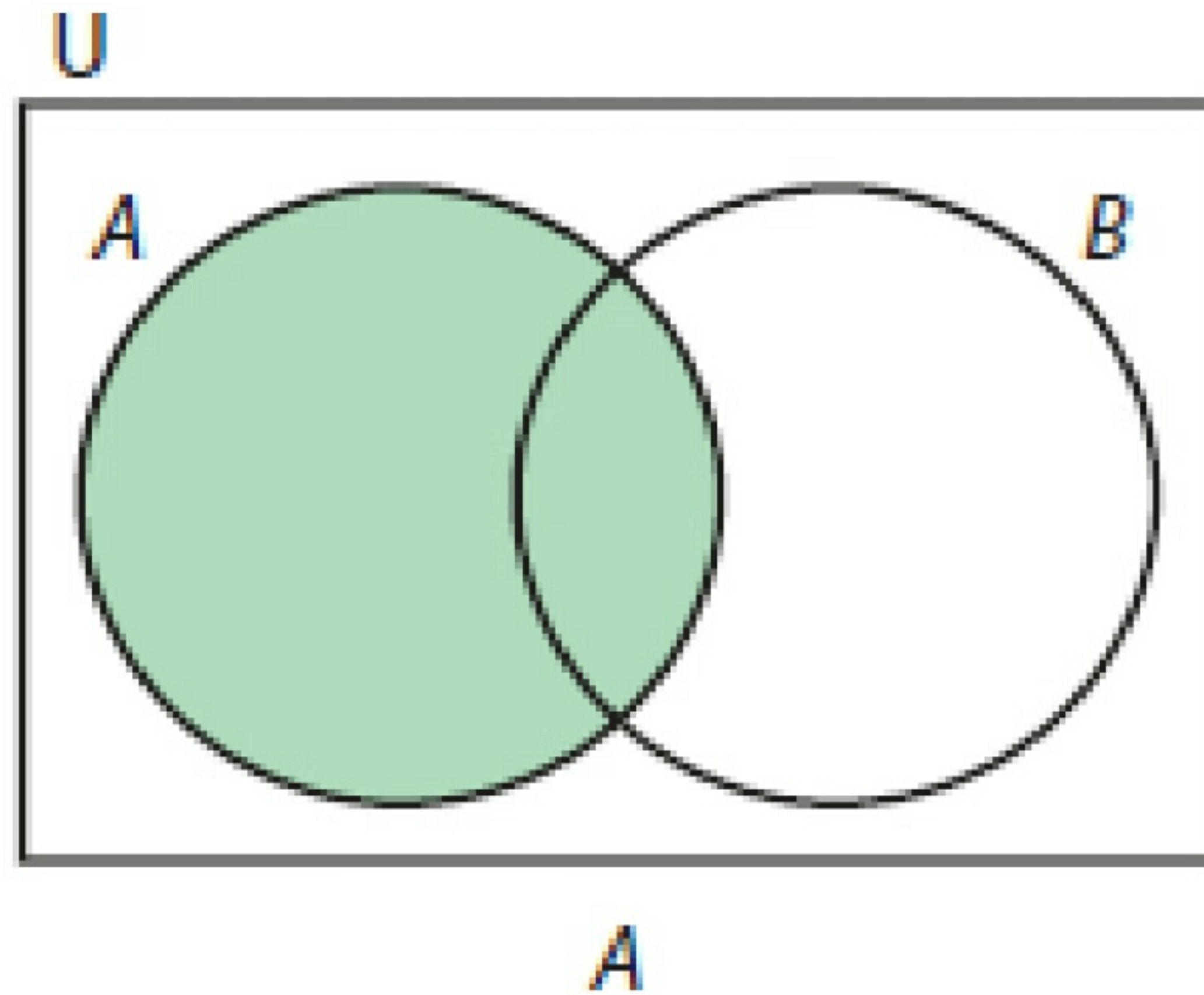
- Elements common to both A and B

## Union of two sets ( $A \cup B$ )

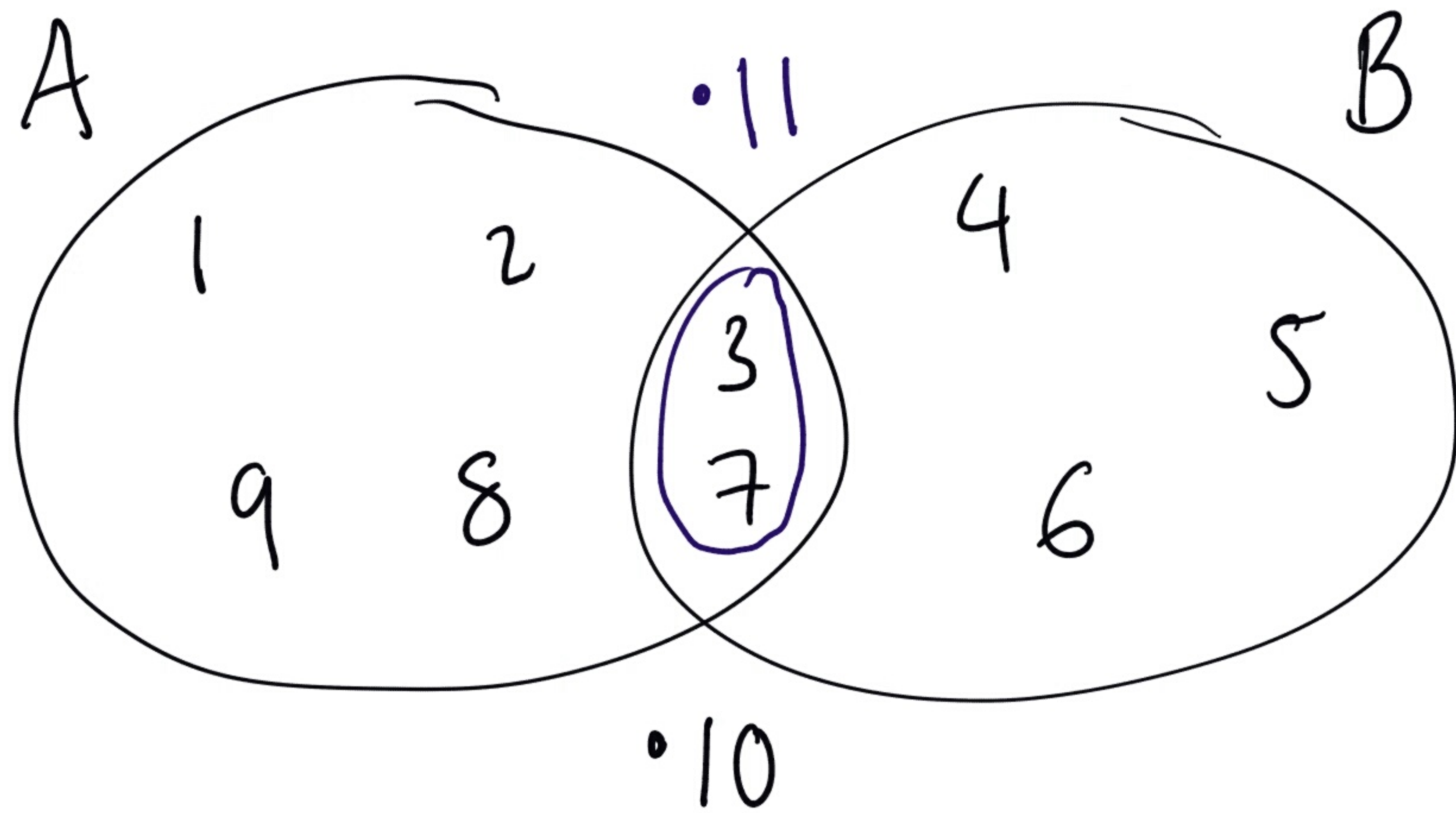
The **union** of two sets  $A$  and  $B$  is found by putting together in a new set all the elements of  $A$  and  $B$  without repeating an element. It is written  $A \cup B$ .



# Set A



- All elements on only set A



$$A = \{1, 2, 3, 7, 8, 9\}$$

$$B = \{3, 4, 5, 6, 7\}$$

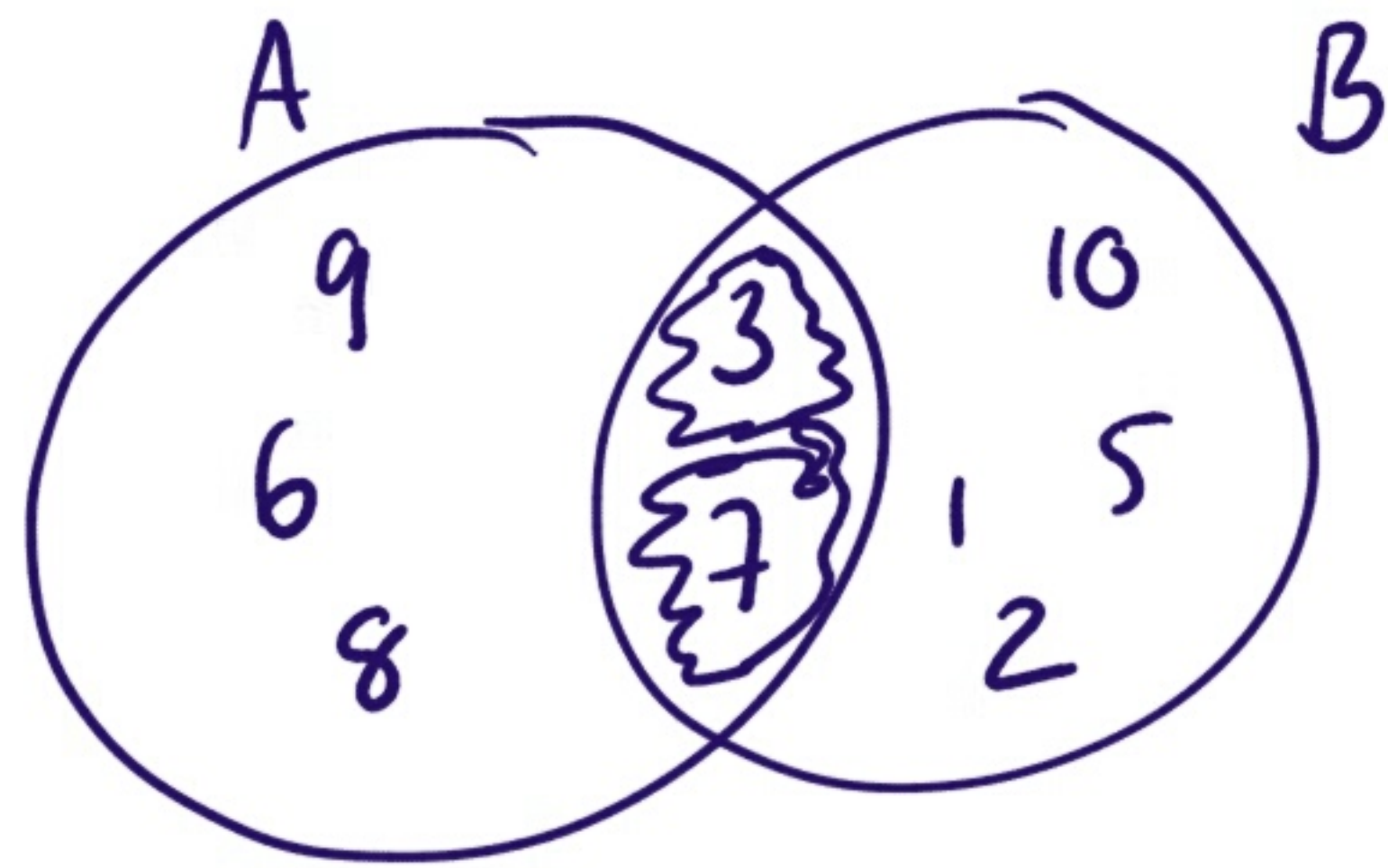
$$\{4\} \text{ or } \{5\} \text{ or } \{6\}$$

$$\underline{B \setminus A}$$

$$A \setminus B = 11, 10$$

$$A \cap B = \{3, 7\}$$

(Q4)

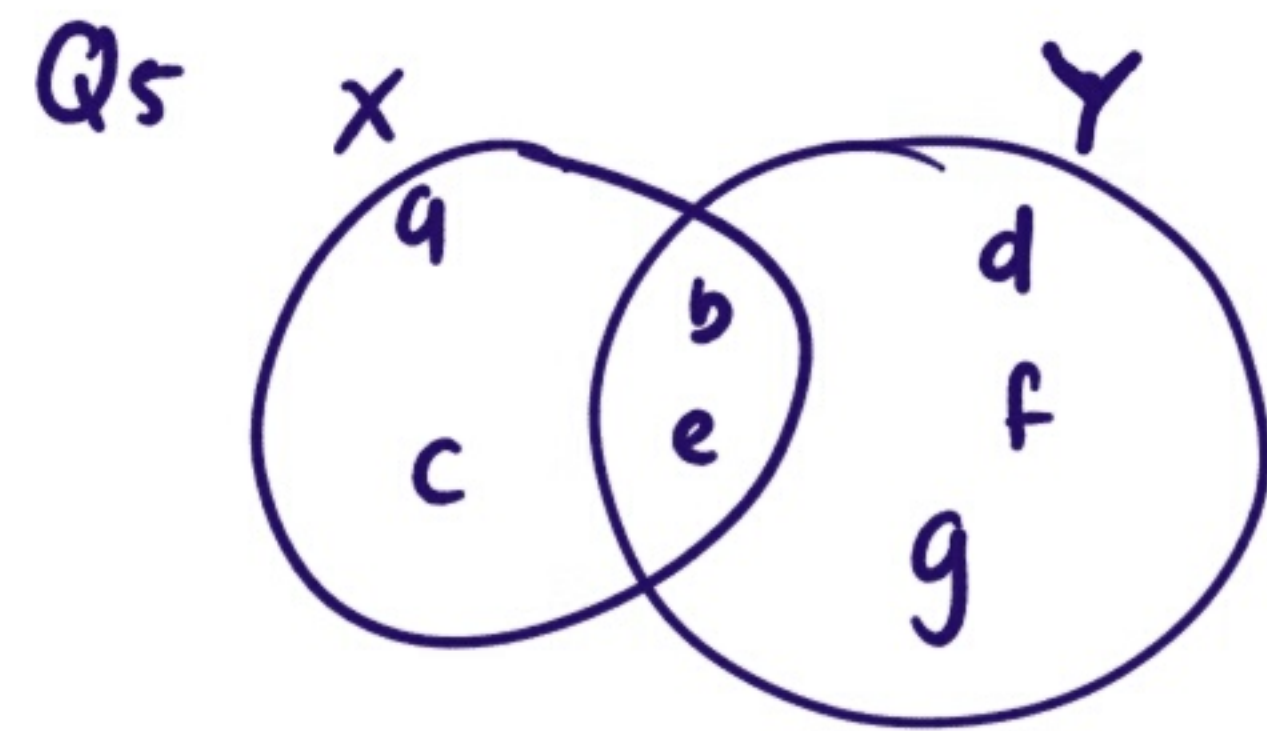


$$A: \{9, 6, 8, 3, 7\}$$

$$B: \{10, 1, 5, 2, 3, 7\}$$

$$A \cap B \rightarrow \{3, 7\}$$

$$A \cup B \rightarrow \{9, 6, 8, 3, 7, 1, 10, 5, 2\}$$



$$X = \{a, b, c, e\}$$

$$Y = \{b, e, f, g, d\}$$

$$X \cap Y = \{b, e\}$$

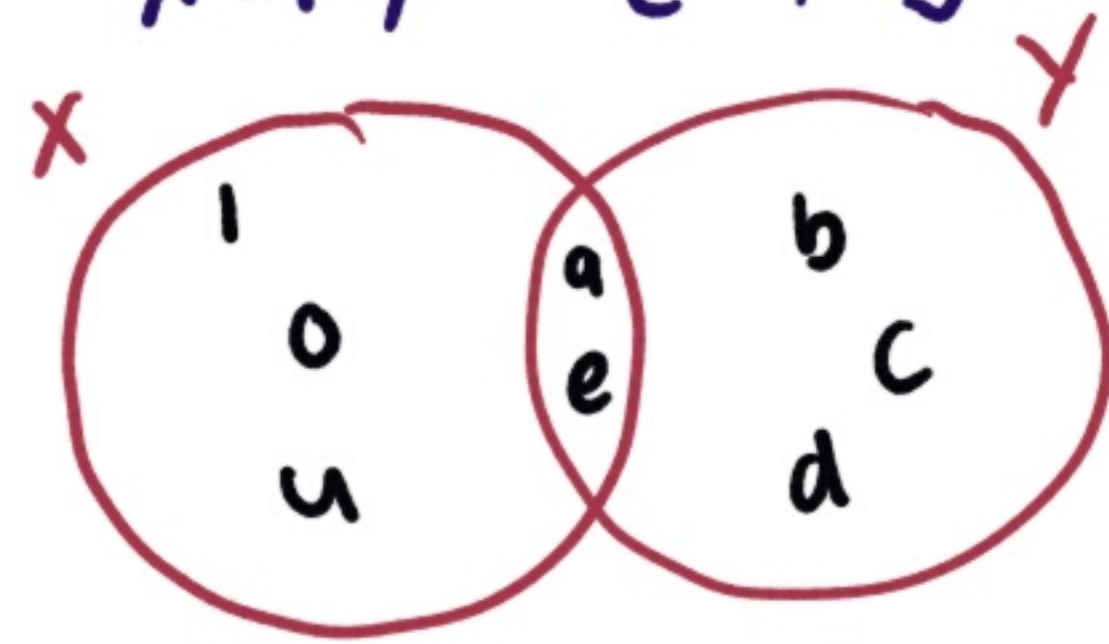
$$X \cup Y = \{a, b, c, d, e, f, g\}$$



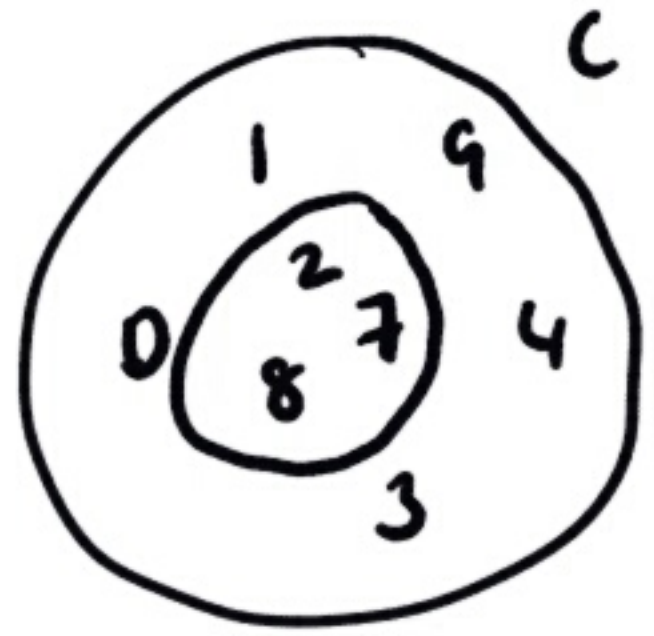
Q7)  $x = \{a, e, i, o, u\}$

$y = \{a, b, c, d, e\}$

$x \cap y = \{a, e\}$



Q10)



$$C = \{1, 9, 4, 3, 2, 1\}$$

$$D = \{2, 7, 8\}$$

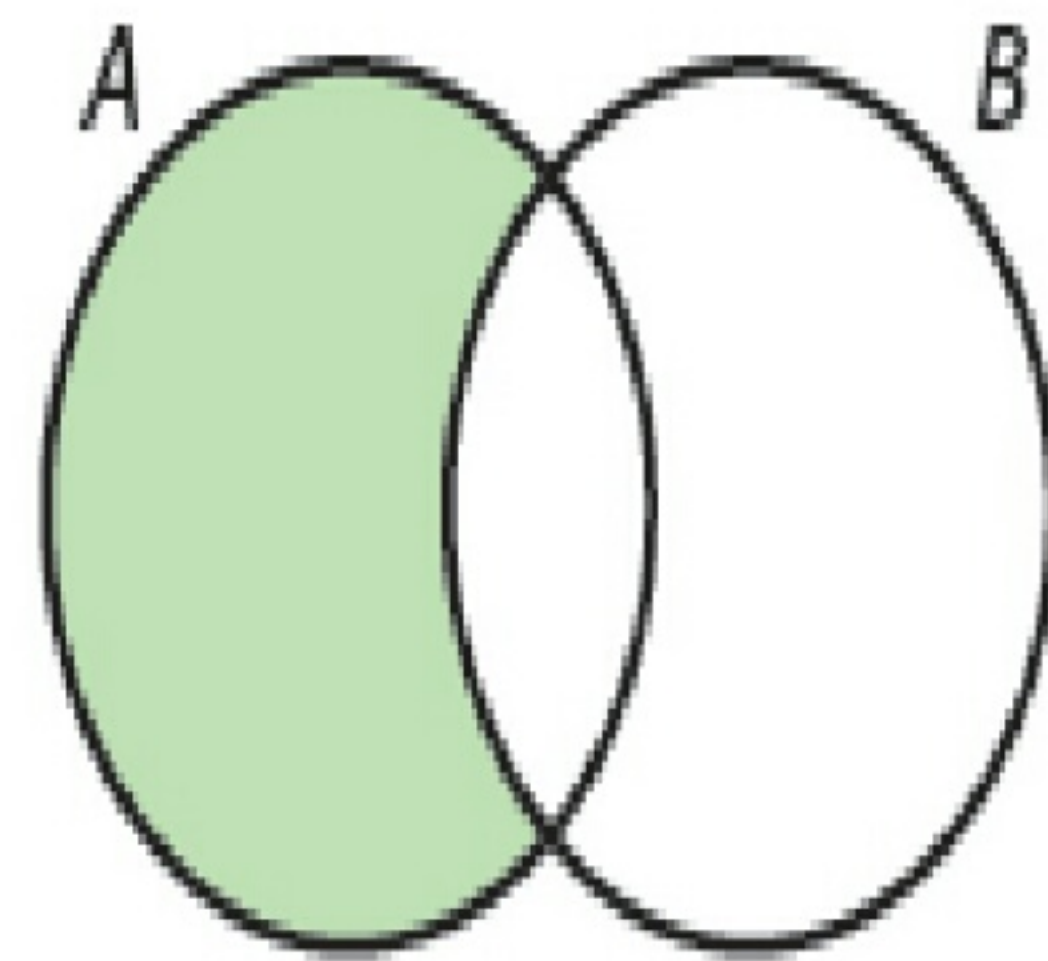
$$C \cap D = \{2, 7, 8\}$$

$$C \cup D = \{1, 9, 4, 3, 2, 8, 7\}$$

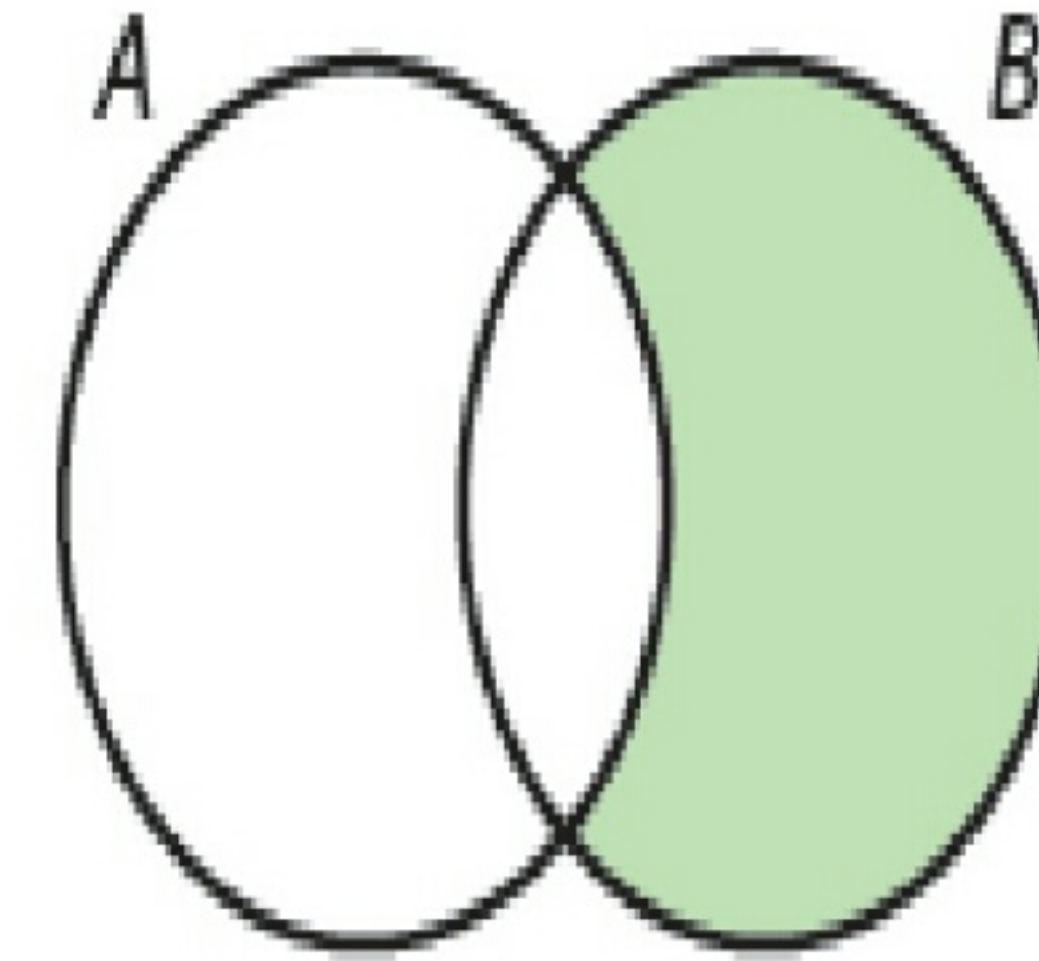
*Set difference*

$A \setminus B$  is the set of elements of  $A$  which are not in  $B$ .

Set difference can be illustrated by Venn diagrams as follows:

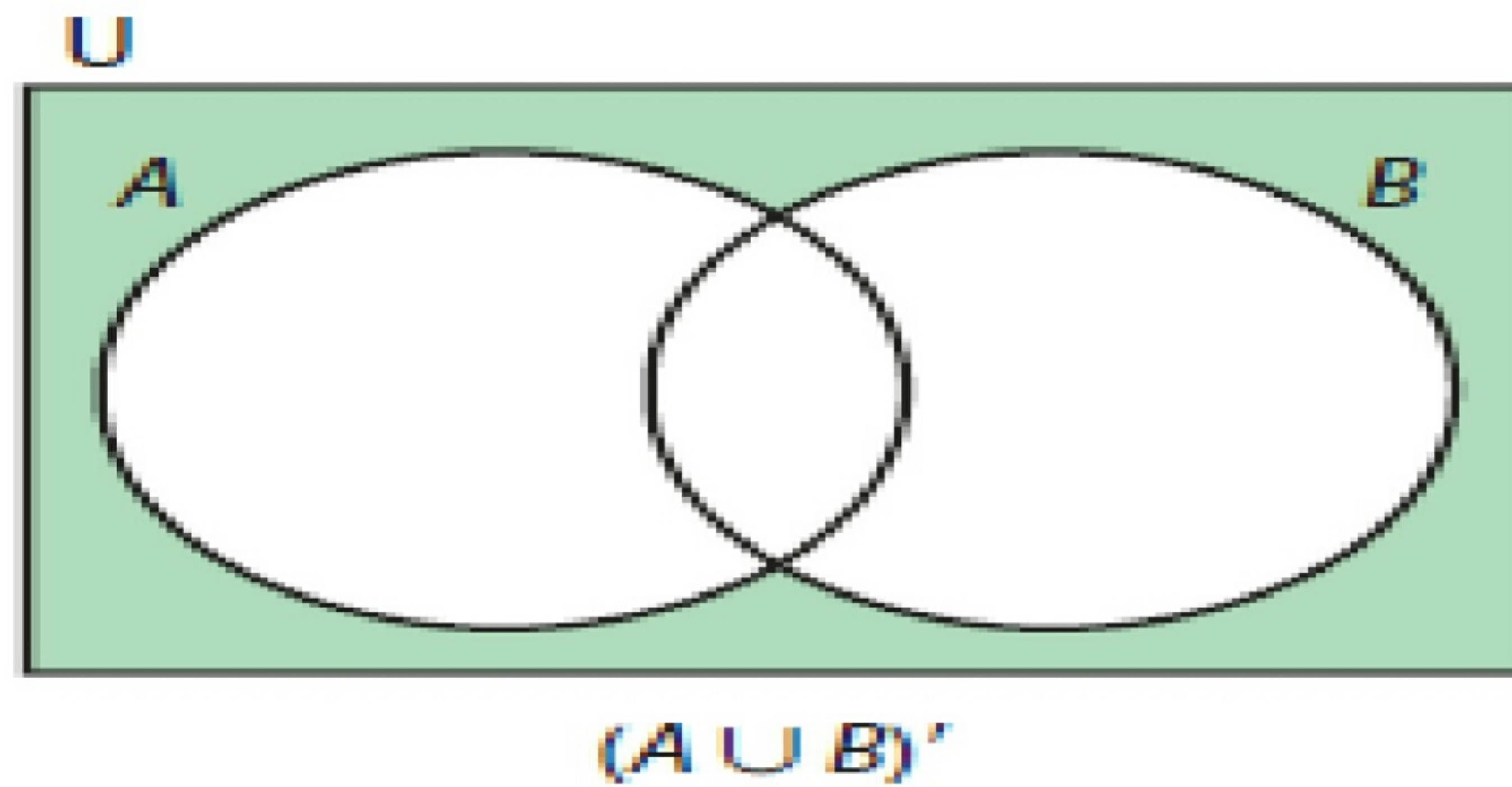


Shaded area is  $A \setminus B$



Shaded area is  $B \setminus A$

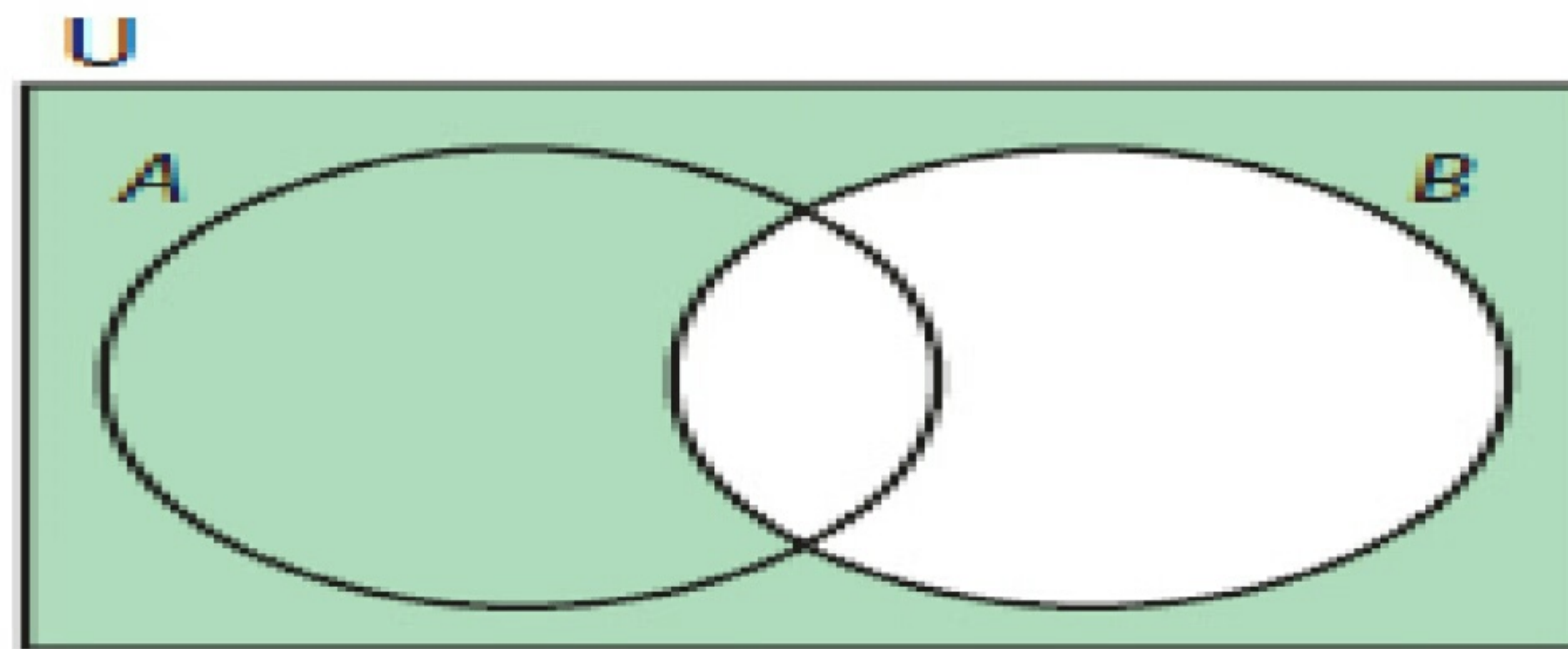
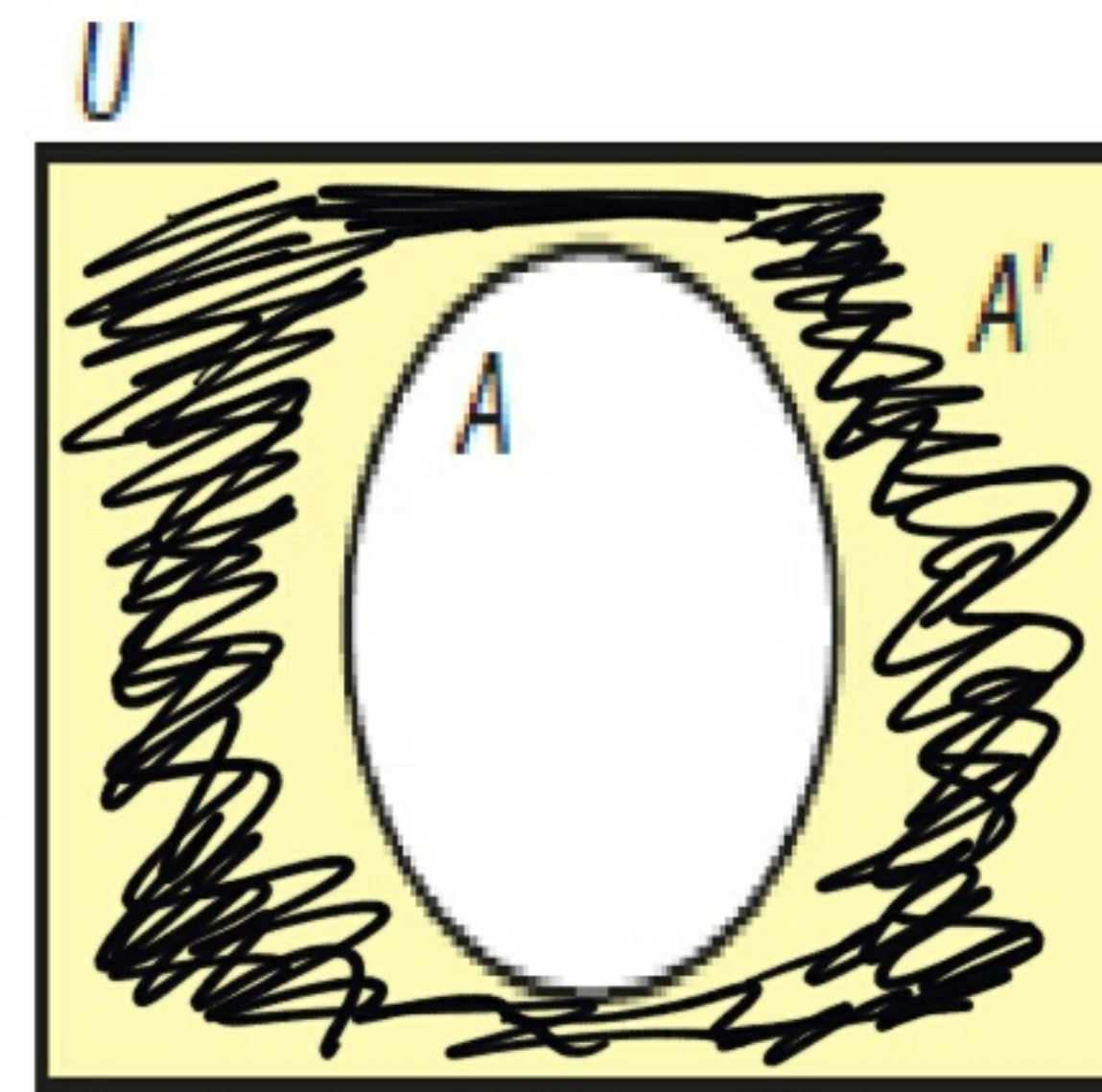
# Complement of $(A \cup B)'$



## The complement of a set ( $A'$ )

The complement of a set  $A$  is the set of elements in the universal set  $U$  which are not in  $A$ .

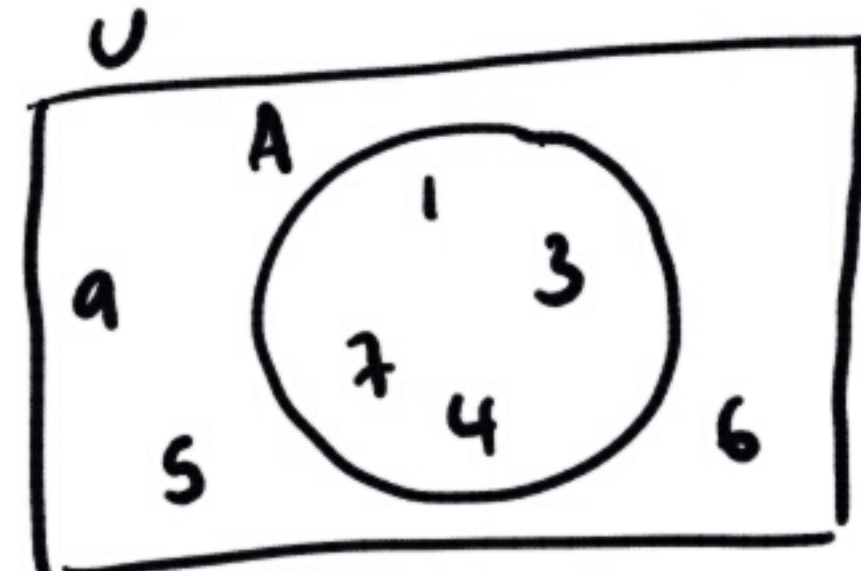
It is written as  $A'$  and is illustrated by the shaded area in the given Venn diagram. Every element outside of set  $A$ .



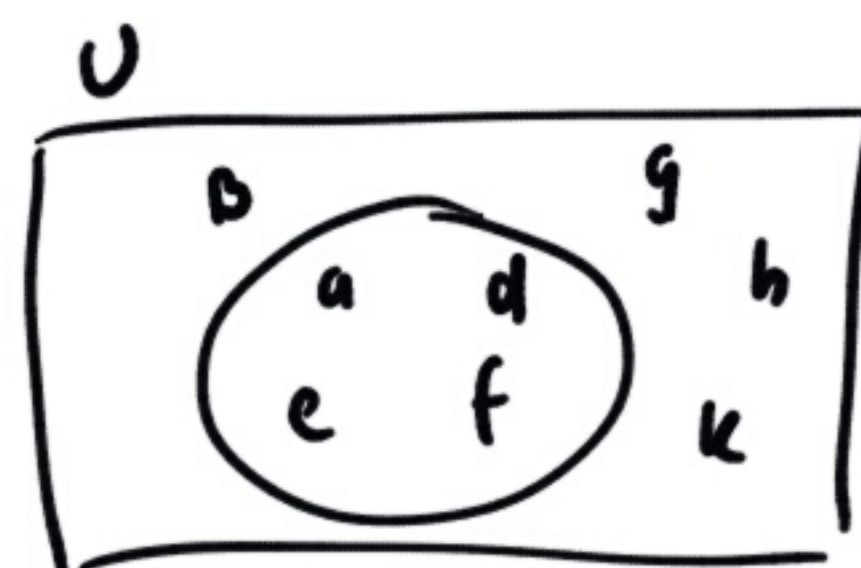
Every element outside the set  $B$ .

Pg 83 Q1 + Q2

Q1)



Q2



H/W Pg 84 Q 3 part (i) to (v)

## The cardinal number of a set (#)

The number of elements in a set is called the **cardinal number** of the set.

The symbol # is used to denote the cardinal number.

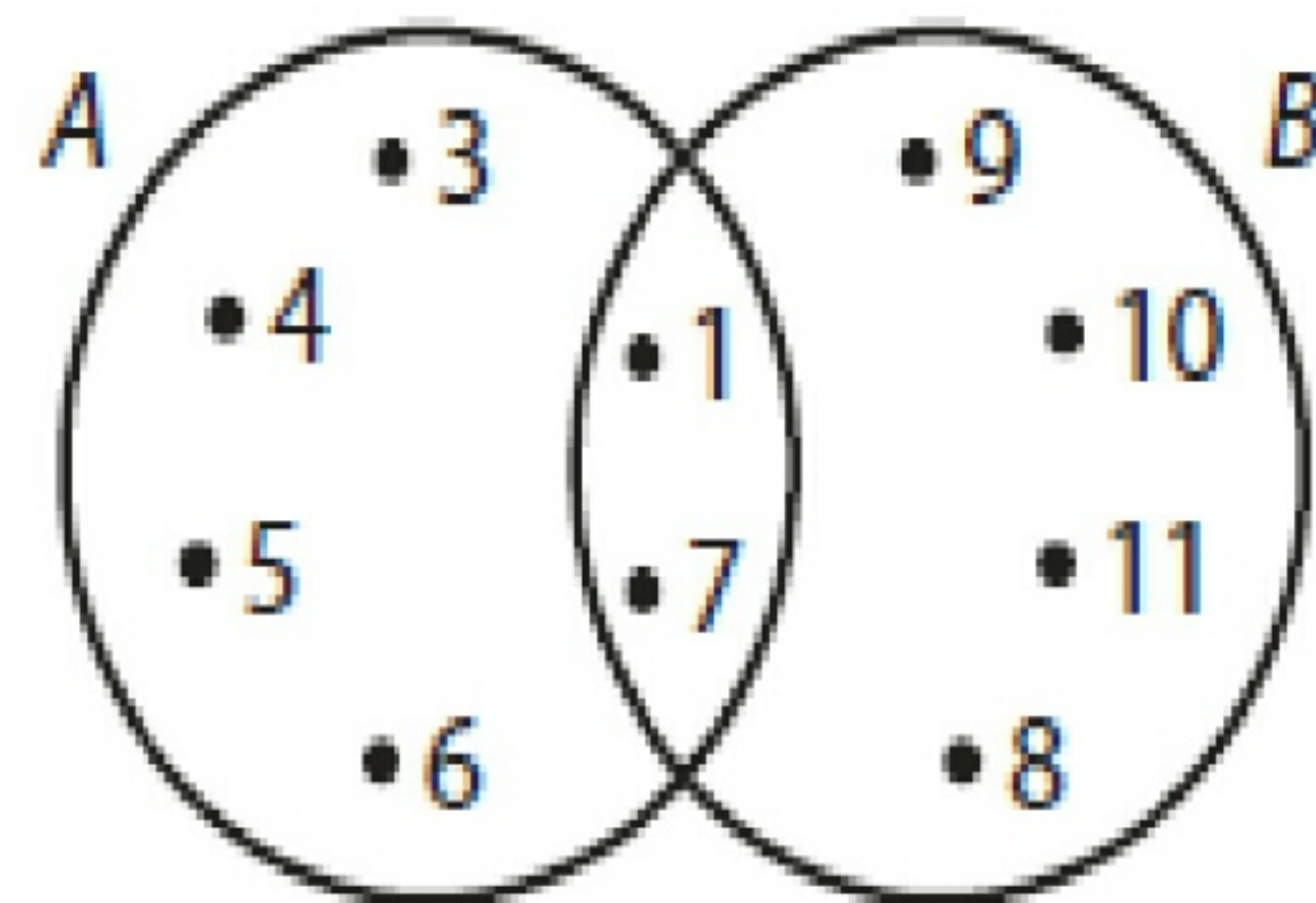
From the given Venn diagram,

$$\#A = 6$$

$$\#B = 6$$

$$\#(A \cap B) = 2$$

$$\#(A \cup B) = 10.$$

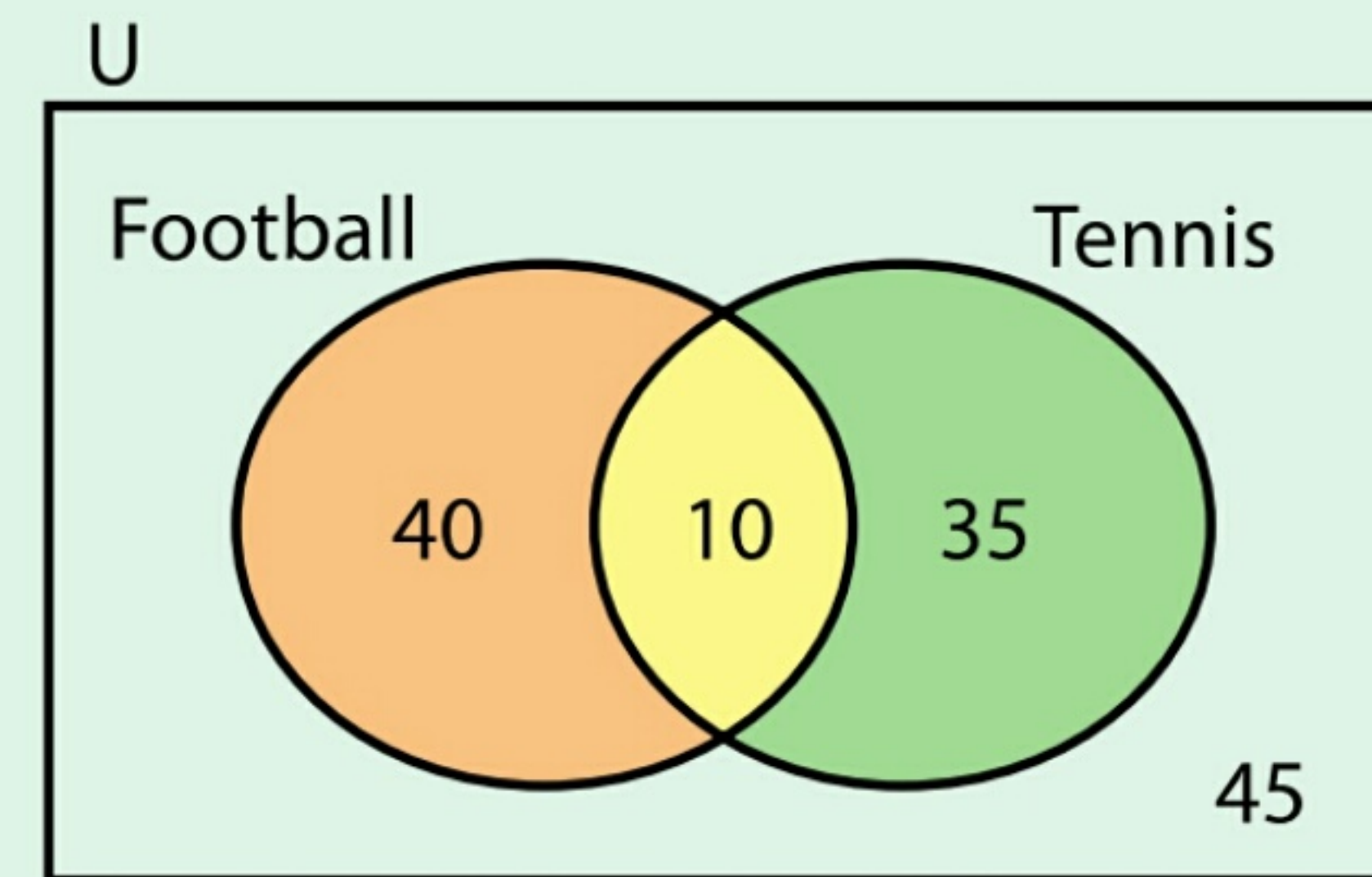


## Example 1

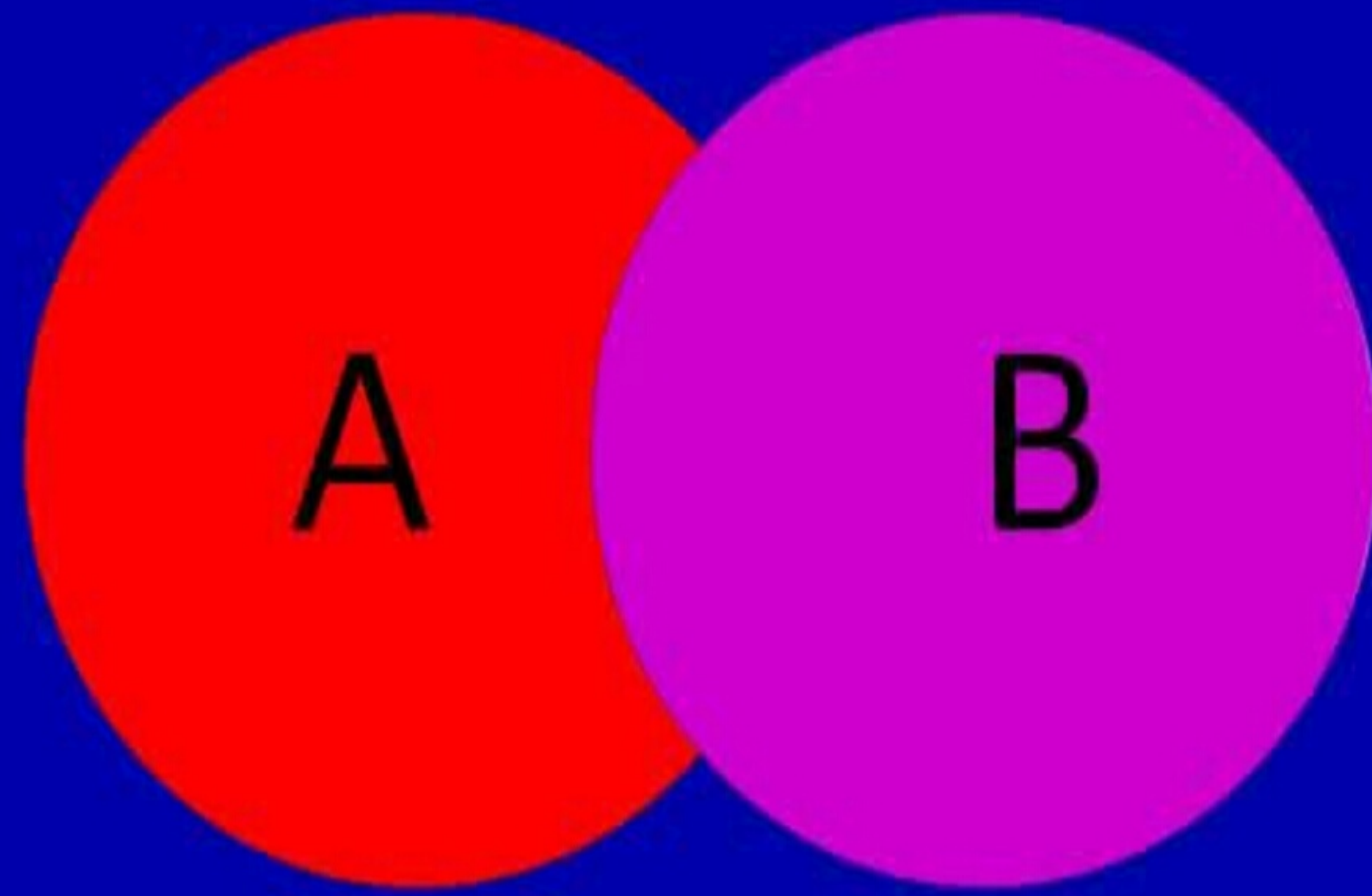
The Venn diagram shows the sports played by members of a club.

How many members played

- (i) both football and tennis
- (ii) tennis but not football
- (iii) neither of these two games
- (iv) football or tennis?

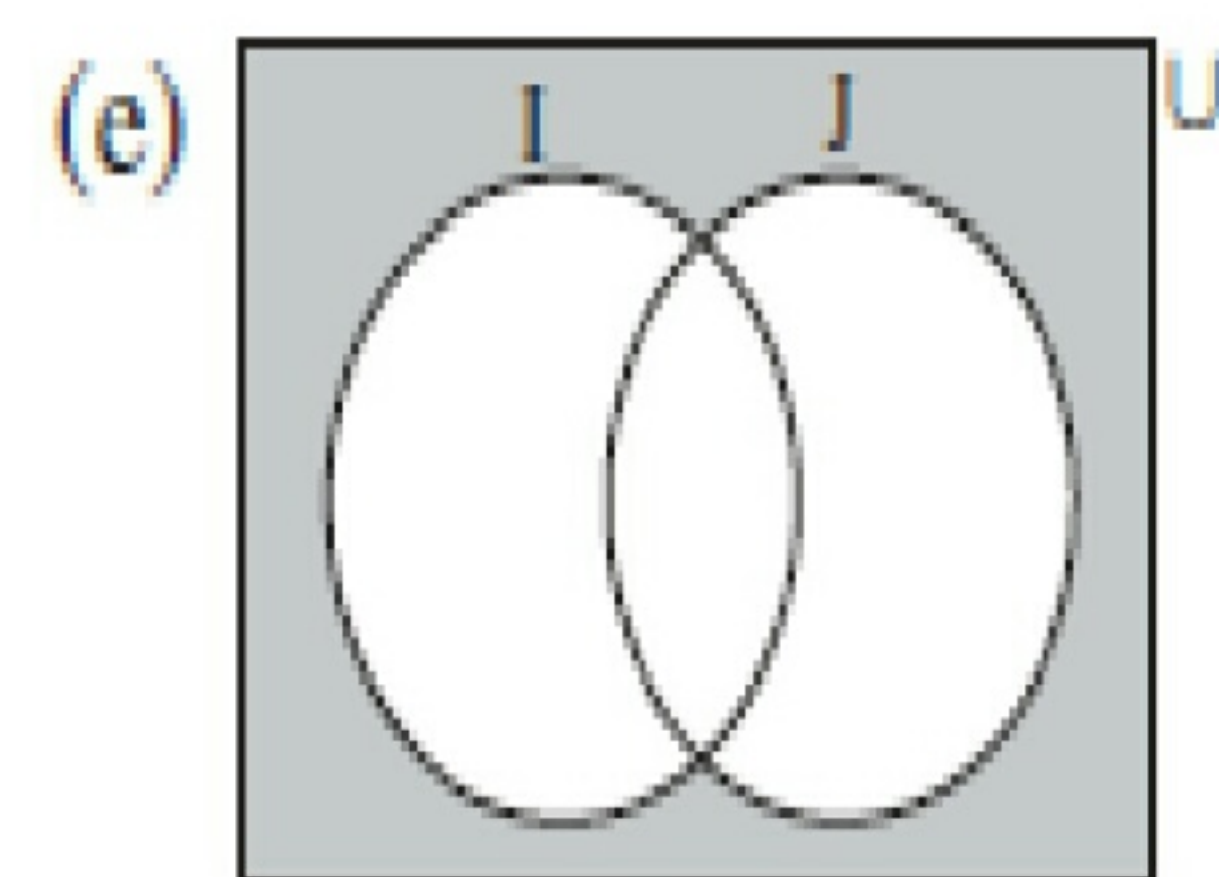
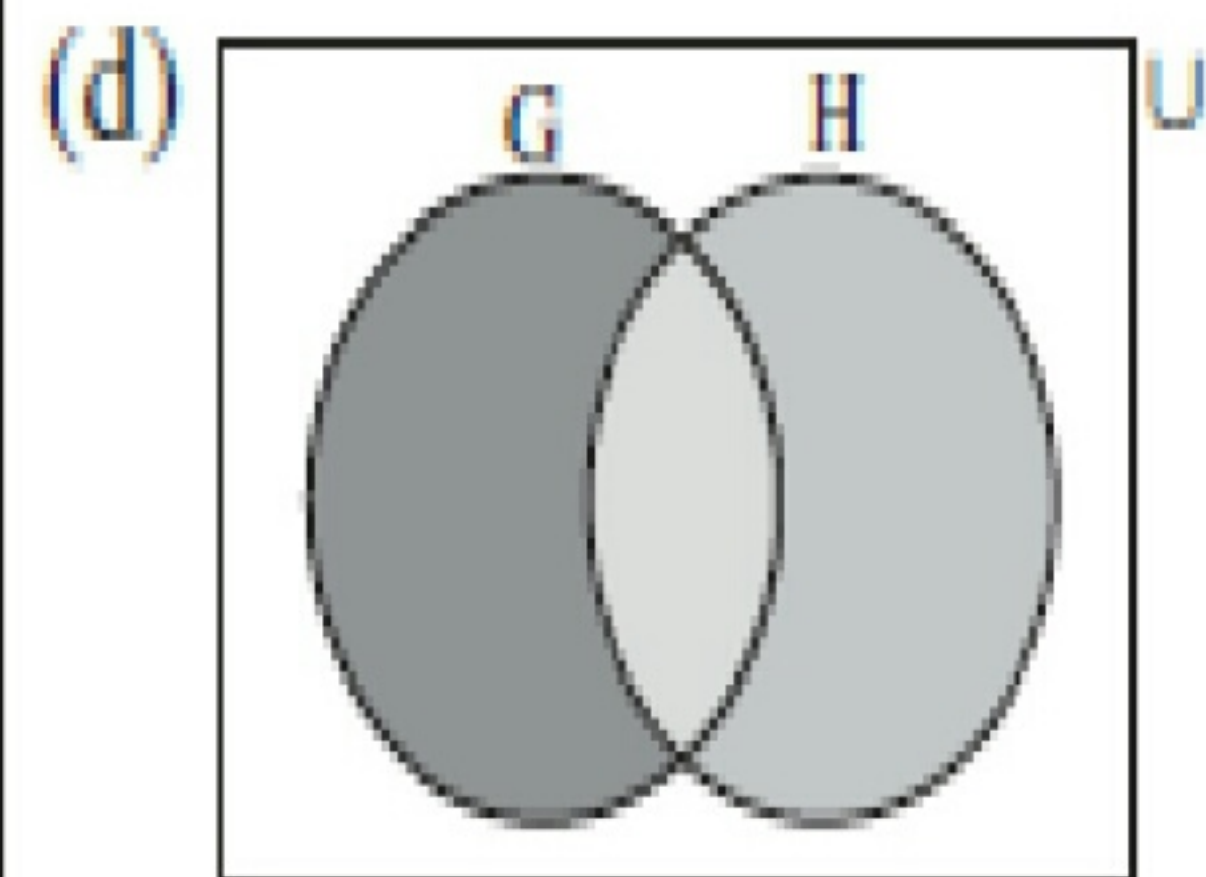
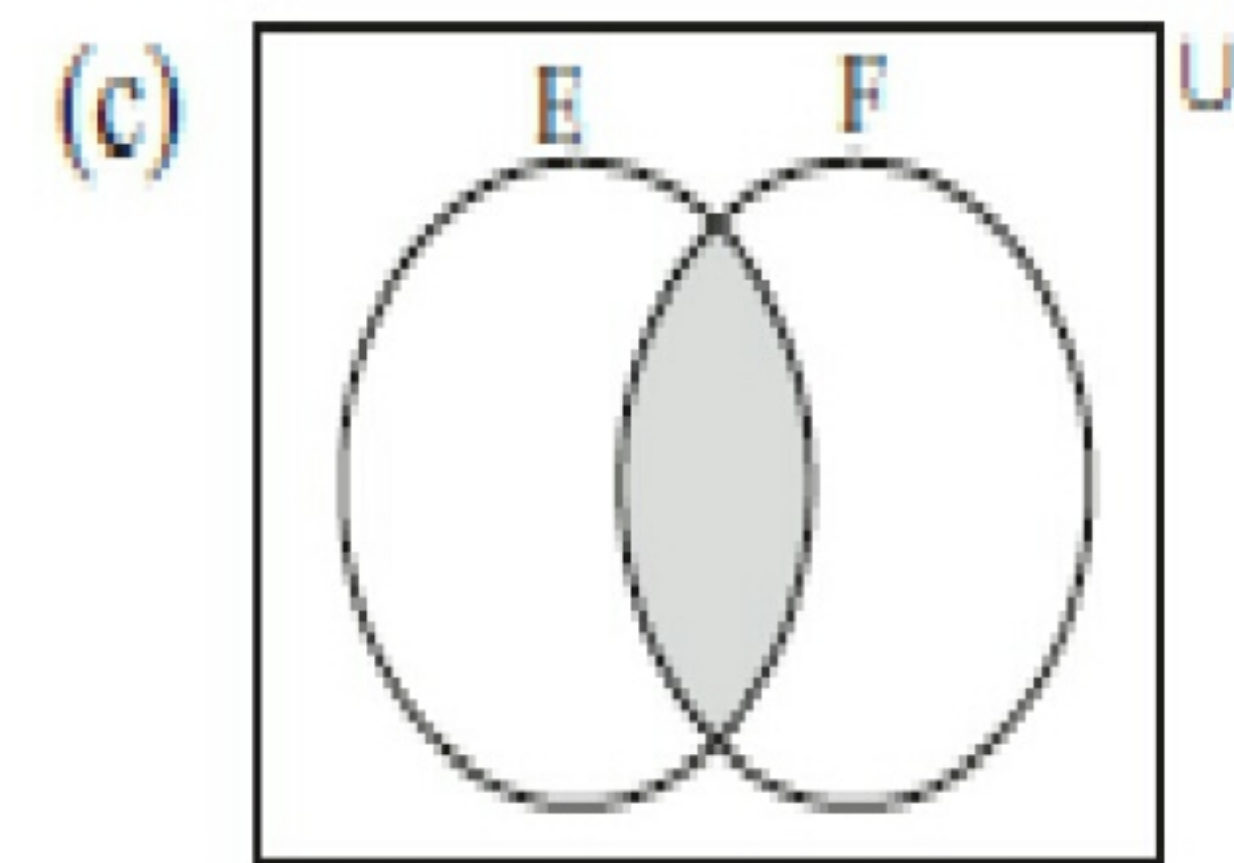
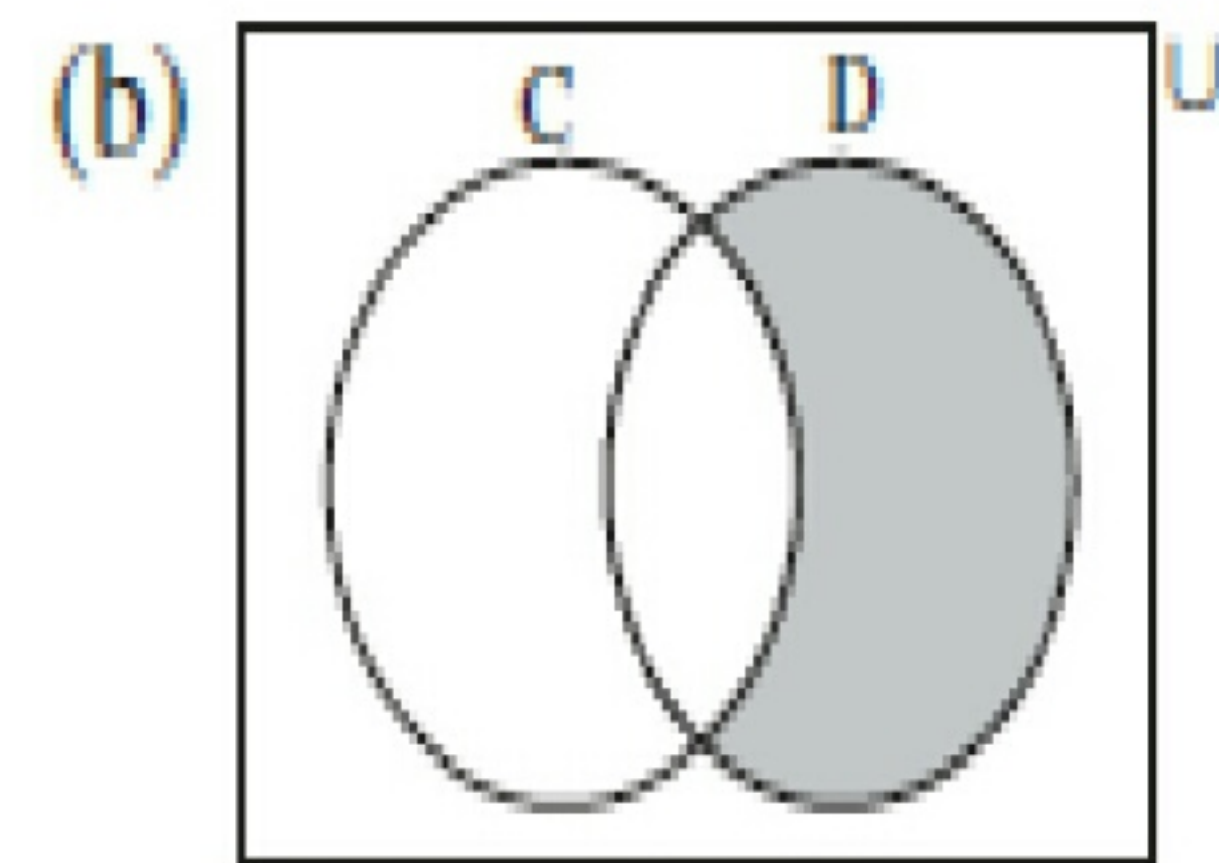
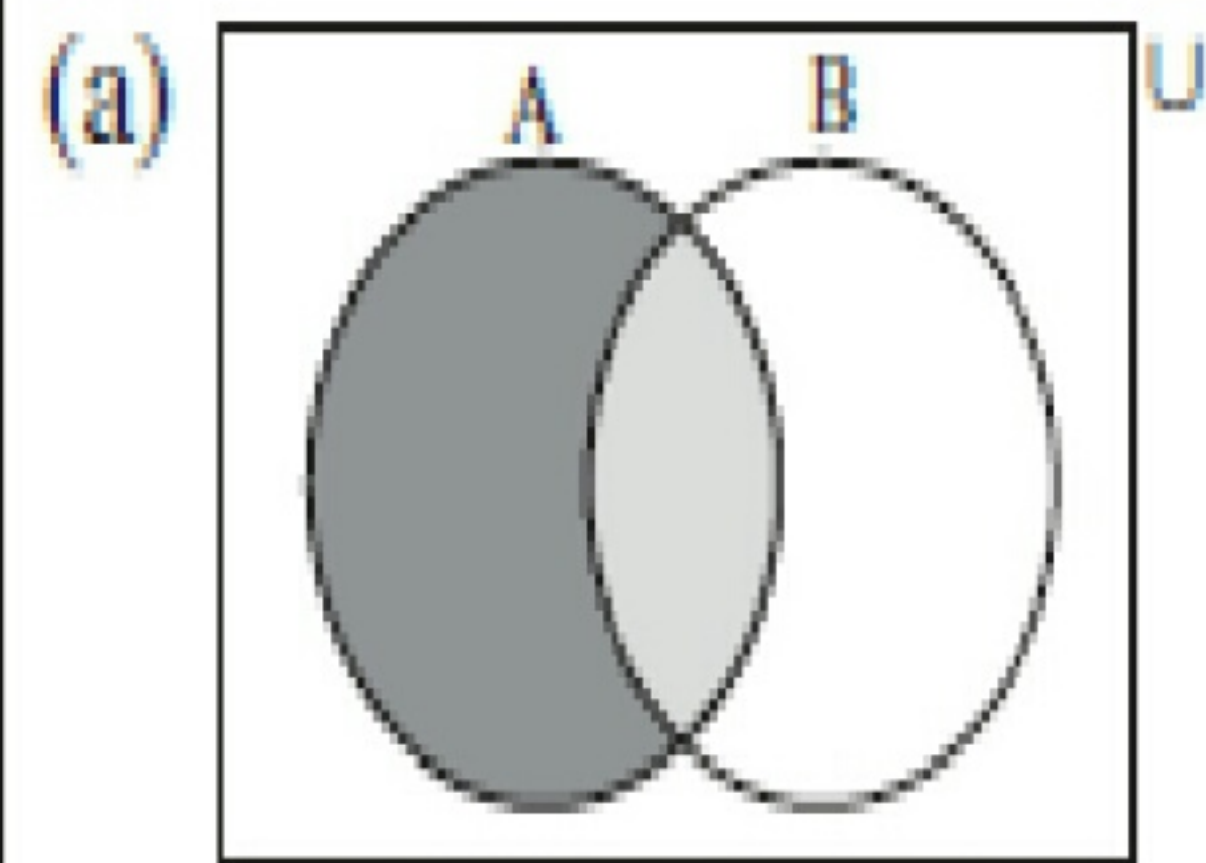






# Sets & Venn Diagrams

1. Name the shaded sets.



# Algebra

## Chapter 3



Venn Diagrams, Unions, and Intersections