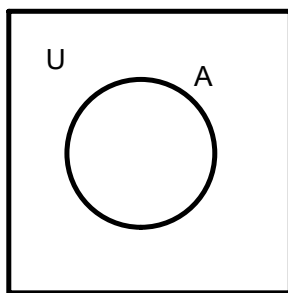


Section 2.3 Venn Diagrams and set operations

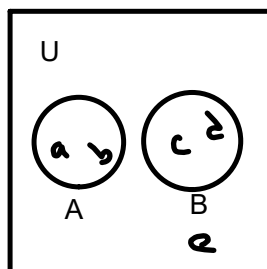
Venn diagrams are used to illustrate set relationships.



rectangle represents the universal set

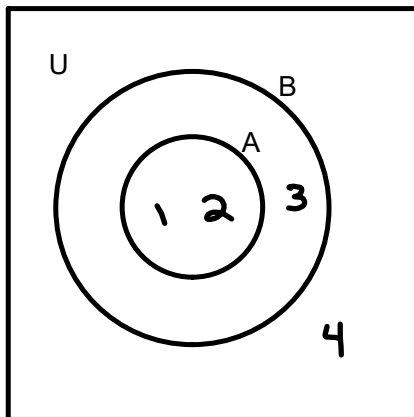
The items inside the rectangle may be divided into subsets

Two sets - 4 possible illustrations



Disjoint - no elements in common.

$$A = \{a, b\} \quad B = \{c, d\} \quad U = \{a, b, c, d, e\}$$

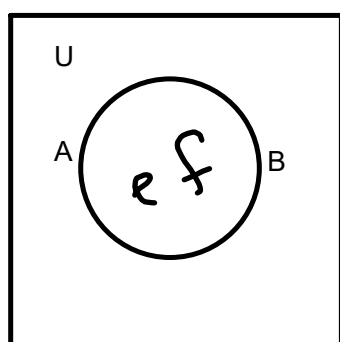


Proper Subset

Set A is a proper subset of set B . Every element in A is also in Set B .

$$A = \{1, 2\} \quad B = \{1, 2, 3\}$$

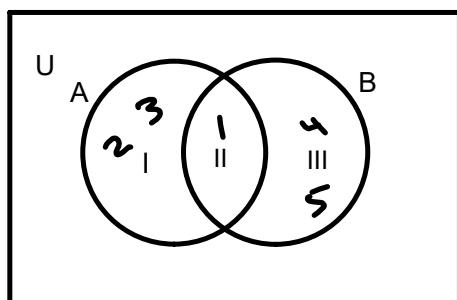
$$U = \{1, 2, 3, 4\}$$



Equal sets

$$A = \{e, f\} \quad B = \{e, f\}$$

Overlapping Sets



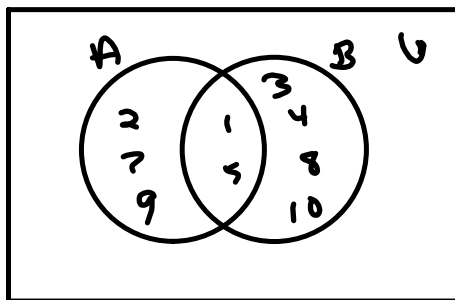
Set A and set B have elements in common. These elements are in region II

$$A = \{1, 2, 3\}$$

$$B = \{1, 4, 5\}$$

$$U = \{1, 2, 3, 4, 5\}$$

Fill in the Venn Diagram



$$A = \{\cancel{1}, 2, \cancel{5}, 7, 9\}$$

$$B = \{3, 4, \cancel{1}, \cancel{5}, 8, 10\}$$

Set Operation

Complement- The complement of a set A, A' , is the set of all elements in the Universal set that are not in Set A

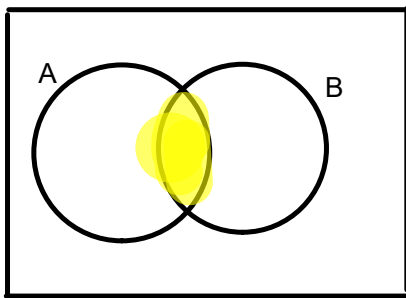


$$U = \{1, 2, \dots, 8\}$$

$$A = \{1, 5, 7\}$$

Find A' $\{2, 3, 4, 6, 8\}$

Intersection – The intersection of set A and B, $A \cap B$, is the set containing all the elements that are common to both set A **and** set B.



$$U = \{1, 2, \dots, 10\}$$

$$A = \{1, 4, 5, 6, 8, 9, 10\}$$

$$B = \{2, 3, 5, 6, 7\}$$

Find $A \cap B$ $\{5, 6\}$

Union - The union of set A and B, $A \cup B$, is the set containing all the elements that are members of set A **or** set B.

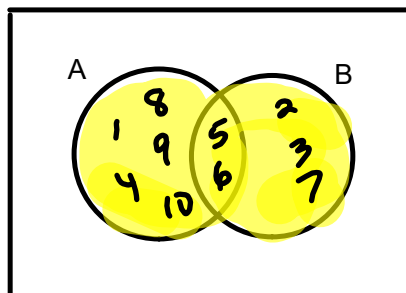
↑
union

$$U = \{1, 2, \dots, 10\}$$

$$A = \{1, 4, 5, 6, 8, 9, 10\}$$

$$B = \{2, 3, 5, 6, 7\}$$

Find $A \cup B$ $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$



Example #6 page 64

$$U = \{a, b, c, d, e, f, g\}$$

$$A = \{a, b, e, g\}$$

$$B = \{a, c, d, e\}$$

$$C = \{b, e, f\}$$

$$A' = \{c, d, f\}$$

$$B' = \{b, f, g\}$$

$$A' \cap B' = \{f\}$$

Determine the following:

$$(A \cup B) \cap (A \cup C)$$

$$(A \cup B) = \{a, b, c, d, e, g\}$$

$$(A \cup C) = \{a, b, c, d, e, f, g\}$$

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

Find

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

$$A \cup B = \{a, b, c, d, e, g\}$$

$$C' = \{a, c, d, g\}$$

$$= \{a, c, d, g\}$$

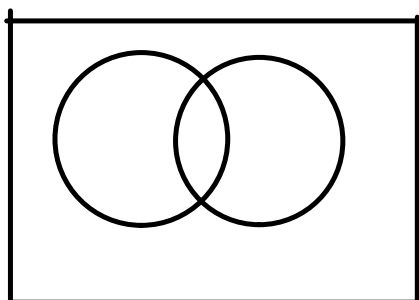
Find

$$A' \cap B'$$

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

$$B = \{9, 10, 11, 12, 1, 2\}$$

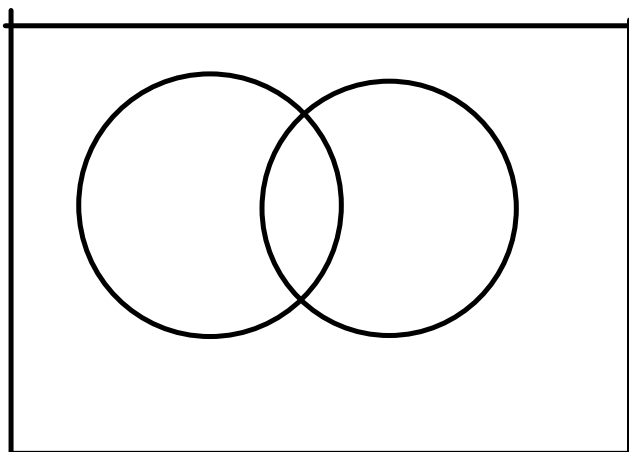
Find $n(A \cup B)$



Find $n(A \cup B)$

$$A = \{a, b, c, d, e, f, g, h\}$$

$$B = \{g, h, i, j, k\}$$



Rule:

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

Example

Set A contains 15 elements
Set B contains 7 elements
Both sets have 4 elements in common

Find the number of elements in the union of set A and B.

page 65 Example 7

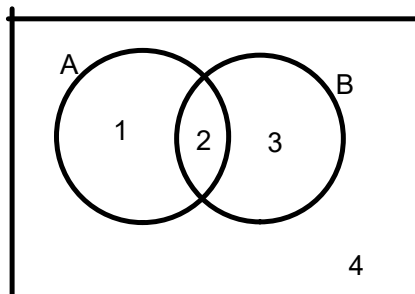
The results of a survey of visitors at the Grand Canyon showed that 25 speak Spanish, 14 speak French, and 4 speak both Spanish and French. How many speak Spanish or French?

Pg 65 Example 8

Of the homes listed for sale with REMAX, 39 have either a three-car garage or fireplace, 31 have a fireplace, and 18 have both a three-car garage and a fireplace.
How many of these homes have a three-car garage?

At Trumbull High School 140 students took Statistics or Applied Topics in Math in 2010. Fifty five took Statistics and 12 took both Statistics and Topics. How many students took Applied Topics?

The difference of two sets A and B, $A - B$ is the set of elements that belong to set A but not to set B.



$A - B = \text{region 1 only}$

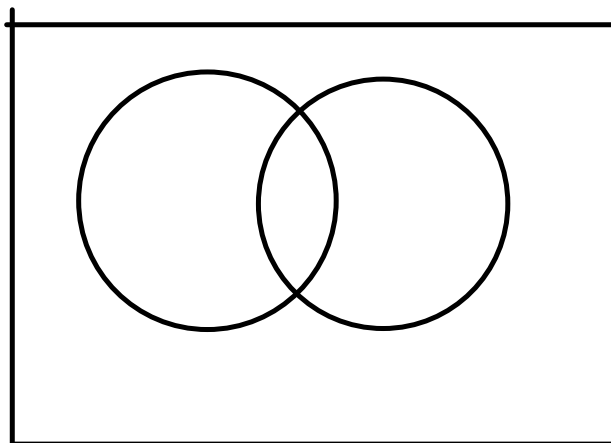


Example

$$U = \{1, 2, \dots, 10\}$$

$$A = \{2, 3, 4, 5, 9, 10\}$$

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



Find:

$$A - B$$

$$B - A$$

$$A - B'$$

