

MATH 1342

Section 2.2

Sets and Venn Diagrams

A set is a collection of objects. Two sets are equal if they contain the same elements.

Set A is a **subset** of set B if every element that is in set A is also in set B . The notation for this is $A \subseteq B$.

Set A is a **proper subset** of set B if every element that is in set A is also in set B *and* there is at least one element in set B that is not in set A . The notation for this is $A \subset B$.

Sets and Subsets

If Set A contains all dogs, and Set B contains all Golden Retrievers, then $B \subseteq A$.

However, $A \subseteq B$ is not true.

An Example of Sets

To belong to Set A, you must be over the age of 25.

To belong to Set B, you must drive a blue car.

Think about which sets you would belong to.

Set Union

The **union** of A and B , which is written as C , is the set of all elements that belong either to set A or to set B (or that belong to both A and B).

If you answered “yes” to either of the questions, you belong in the set union.

Set Intersection

The **intersection** of A and B , which is written as $A \cap B$, is the set of all elements that belong to both to set A and set B . If the intersection of two sets is empty (the empty set is denoted by \emptyset), then the sets are **disjoint** or **mutually exclusive** and we write $A \cap B = \emptyset$

If you answered, “yes” to both questions, you belong in set intersection.

Set Compliment

The **complement of set A** , which is written as A^c , is the set of all elements that are in the universal set but are not in set A .

If you answered “no” to question A, you belong in the set compliment.

Examples:

Use the following information to answer the questions:

$$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$$

$$A = \{1, 2, 5, 6, 9, 10\}$$

$$B = \{3, 4, 7, 8\}$$

$$C = \{2, 3, 8, 9, 10\}$$

Find: A^c

$$A \cup C$$

$$A \cap B$$

$$A^c \cap C$$

$$(B \cup C)^c$$

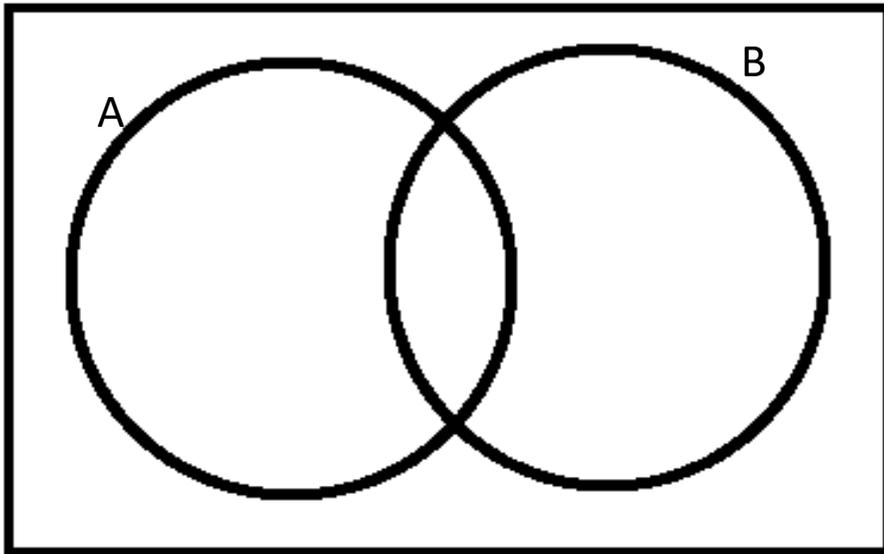
$$A \cap B \cap C$$

Venn Diagrams

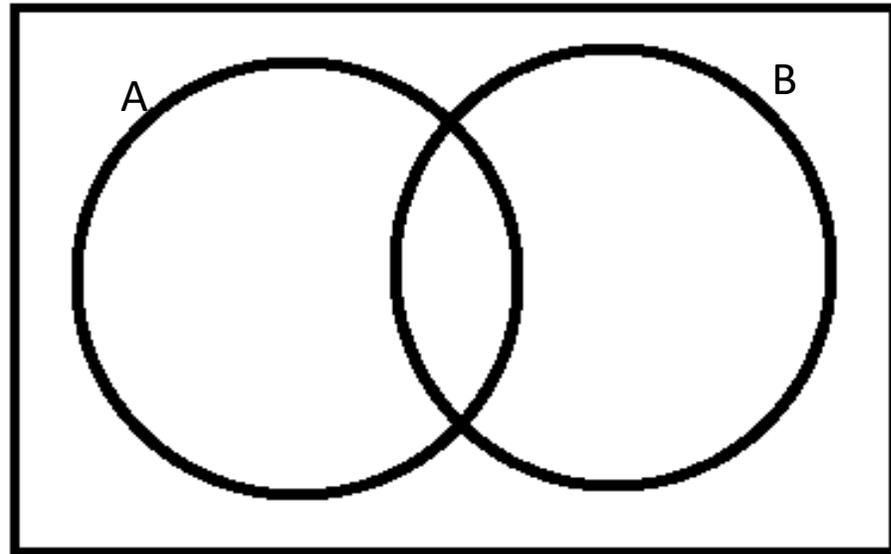
These are also known as “circle diagrams,” and they can be used to represent sets.

Shade in

$$A \cap B$$

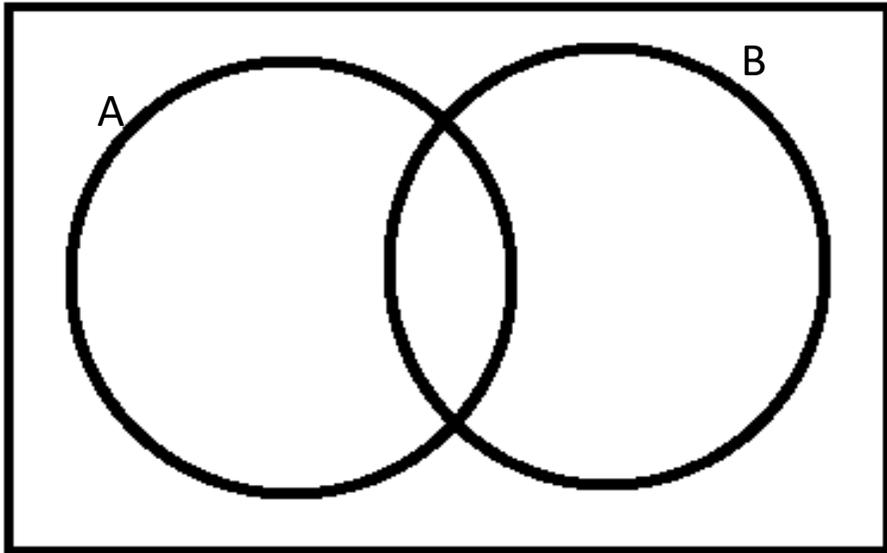


$$A \cup B$$

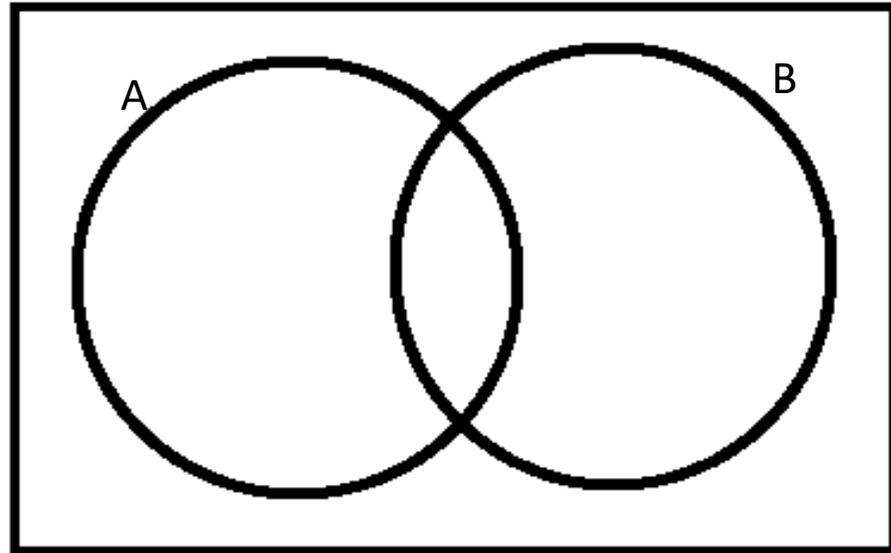


Venn Diagrams

Shade in A^c



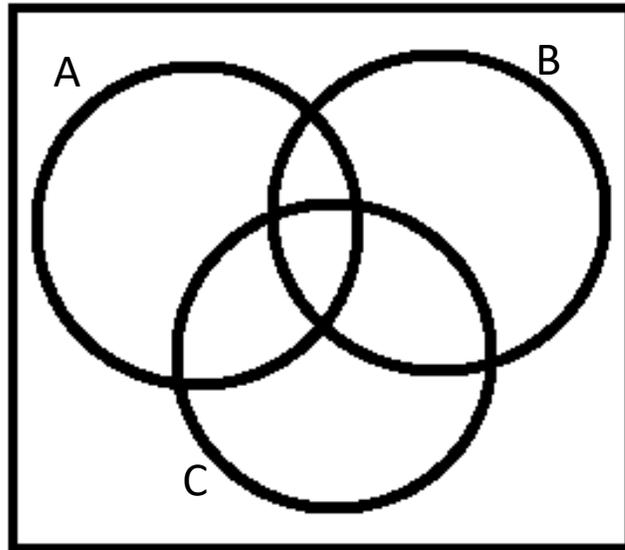
$(A \cap B)^c$



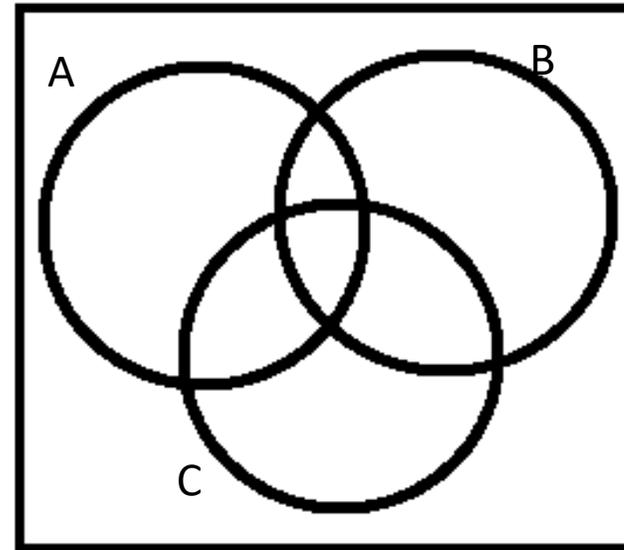
Venn Diagrams

Shade in

$A \cap B \cap C$



$A \cap C$



Application

Draw a Venn Diagram for the following situation:

A group of 100 people are asked about their preference for soft drinks.

The results are as follows:

55 Like Coke 25 Like Diet Coke
45 Like Pepsi

15 like Coke and Diet Coke 5 Like all 3
soft drinks

25 Like Coke and Pepsi 5 Only like
Diet Coke

