

$F: \{ \text{Jane, Mary, Susan, Dana} \}$

Here F is the set name. ":" means "assignment" and/or "definition."

$\{ \}$ state the beginning and ending of enumeration which is orderless.

Let's say $M: = \{ \text{Bob, Joe, Max, Dana} \}$

Note: Ven diagram can be used to note the intersection (common el.) of 2 or more sets.

$\mathbb{N} = \{ 1, 2, 3, \dots \}$ \rightarrow implied.

$\mathbb{Z} = \{ \dots, -1, 0, 1, 2, 3 \}$

\in - element inclusion

Jane $\in F$

$\{ \text{Jane, Mary, Dana, Susan} \} = F$ True.

$\{ \text{Jane, Mary} \} = F$ False.

• Subsets

$\{ \text{Jane, Mary} \} \subseteq F$ - Every element of the left hand side is contained by the right hand side.

• Proper Subset - A proper subset of A is a subset of A that is not equal to A .

$\{ \text{Jane, Mary} \} \subset F$

$\{ \text{Jane} \} \subseteq F$ True.

$\{ \text{Jane} \} \in F$ False.

• Union - collection of all distinct elements in the sets

$F \cup M = \{ \{ \text{Jane, Mary, Susan, Dana} \}, \{ \text{Bob, Joe, Max, Dana} \} \}$

$= \{ \text{Jane, Mary, Susan, Dana, Bob, Joe, Max} \}$

Dana $\in F \cup M$ True.

$\mathbb{N}_0 = \mathbb{N} \cup \{ 0 \}$ adding "0"

Lecture 1 08/25/26

Intersection - a set that contains elements that are both in A and B.

$$F \cap M = \{\text{Dana}\}$$

$$F \cap \{\text{Bob}, \text{Max}\} = \{\} \quad \text{empty set}$$


$$\emptyset \notin F \quad \text{True.}$$


A and B are mutually exclusive

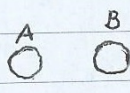
$$\text{If } A \cap B = \emptyset$$


(If A then can't be B)

• Difference / Subtraction

$$A - B$$


$$B - A$$


$$A \cap B = \emptyset$$


$$A \subseteq B$$


$$\text{then } A \setminus B = \emptyset$$

• Power Set

$$A = \{1, 2, 3\} \quad 2^{|A|} = \{B: B \subseteq A\} = \{\{1, 2, 3\}, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{\emptyset\}\}$$

• Set Cardinality - number of elements in the set.

$$|A| = 3$$

$$|\emptyset| = 0$$

$$\text{For the finite set } S, \quad |2^S| = 2^{|S|}$$

$$|F \cup M| \stackrel{?}{=} |F| + |M|$$

$$\begin{array}{ccc} \parallel & & \parallel \\ 7 & \neq & 4 + 4 \end{array}$$

Therefore, it is False

• Ω - universe set - is a class that contains all the elements/entities one wishes to consider in a given situation.

What's the probability a random name is female?

$$P(A) = \frac{|A|}{|\Omega|}$$

$$\Omega = F \cup M \quad (\text{assume})$$