COMP 1002 Survival Guide

Joshua Murphy

April 6, 2018

Contents

1 Propositional Logic

1.1 Implication

In logic, an Implication is a

$$p \rightarrow q \tag{1}$$

This is read as "*p implies q.*" In this case P = it is raining, and Q = there are clouds. Insert truth table

1.1.1 Example:

$p \rightarrow q$

1.2 Biconditional

$$p \iff q \tag{2}$$

This is read as "*p if and only if q.*" Both P and Q must be the same value. This differs from $\wedge$ in which both values must be *true.* For example, P = taking a flight and Q = buying a ticket. It is false when they have opposite values. You can take the flight if and only if you buy a ticket.

$\equiv \in \notin \emptyset \forall \exists \rightarrow \leftrightarrow \sigma \psi \phi$

2 Predicates, Quantifiers, Sets

2.1 Sets

2.2 Predicates

Contradiction: False all the time

Satisfiable: True if it's true at least once.

Valid: True all the time

A Set is a collection of objects.

2.2.1 Set Builder Notation

Set Builder Notation is a form of mathermatical notation to describe a range of values without having to write each number out individually. For example, instead of saying $\mathbb{S} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ we can say $\{\mathbb{S} = x \in \mathbb{R} | 1 \leq x \leq 10\}$ in order to denote the same thing, but in set builder notation.

2.2.2 Types of Common Sets

$\emptyset$ denotes the empty set
$\mathbb{S} = \{1, 2, 3\}$ denotes the set containing 1, 2, and 3.
$\mathbb{N} = \{1, 3, 3 \cdots\}$ is the set of *natural* numbers. Usually starts at 1
$\mathbb{Z} = \{\cdots, -2, -1, 0, 1, 2 \cdots\}$ is the set of integers, which can be negative

So, on forth for real numbers, complex, rational, etc. You can also create your own sets with whatever names or letters you wish, and in questions you'll see sets containing any sort of values representing any kind of category. If you are a programmer, you can think of them like arrays.

2.2.3 Set Elements

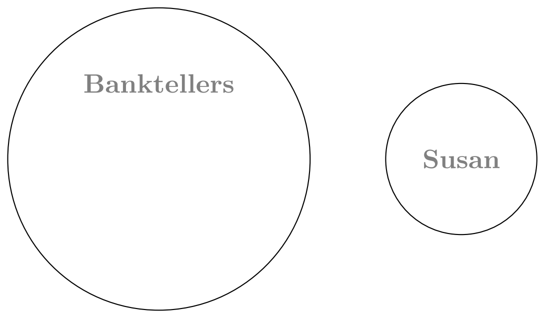
Means that element a is in set S:

$$a \in S \tag{3}$$

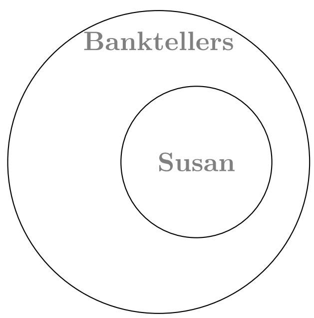
Means a is not in S:

$$a \notin S \tag{4}$$

Susan is not a bankteller, i.e Susan $\notin$ Banktellers:

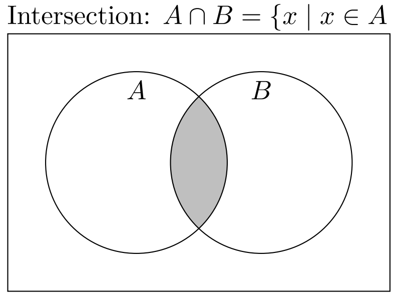


Susan is a bankteller, i.e Susan $\in$ Banktellers:

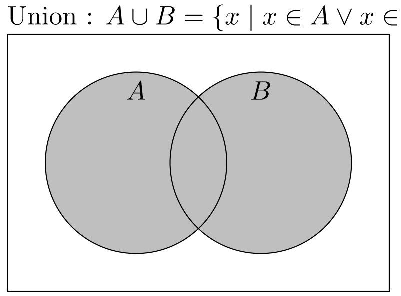


2.2.4 Operations on Sets

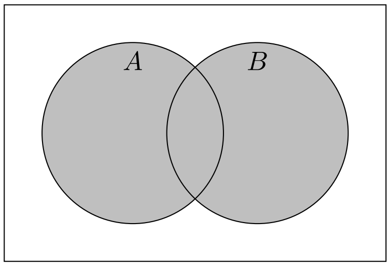
Intersection: $A \cap B = \{x \mid x \in A \wedge x \in B\}$



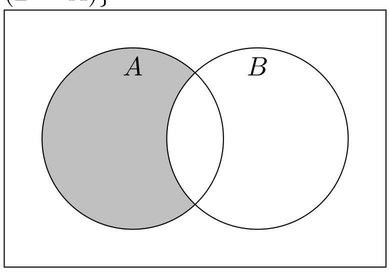
Union : $A \cup B = \{x \mid x \in A \vee x \in B\}$



Set Difference : $A \setminus B = \{x \mid x \in A \wedge x \notin B\}$



Symmetric Difference : $A \Delta B = \{(A - B) \cup (B - A)\}$



Complement: $\bar{A} = \{x \in U \mid x \notin A\}$

Subset: $A \subset B$
Proper Subset: $A \subseteq B$

Glossary

Implication valid knowledge used to refer to an area of human endeavour, an autonomous computer activity, or other specialized discipline. 2

Set A collection of objects. 3

Set Builder Notation A form of mathematical notation to denote a range of numbers instead of writing them out individually. Follows the format $\{x \in \mathbb{R} | y \leq x \leq z\}$. 3