1 Set Theory

1.1 Introduction

Quick recap on Naive set theory, meaning;
1. Introducting the basic concept of sets;
2. Introduce notation;
3. Illustrate Union, Intersection, and Set Diffrenece operations;
4. Venn diagrams as proof;
5. Power sets;
6. How to proof with more rigor.

Question: Why are sets relevant to computing?
We have to represent data to compute it.
To group data, we put it into sets.

Some sets that I have seen before:

$$\text{The set of natural numbers} : \mathbb{N} = \{1, 2, 3, ...\}$$
$$\text{The set of integers} : \mathbb{Z} = \{..., -3, -2, -1, 0, 1, 2, 3, ...\}$$

Sets are denoted with capital letters, e.g. A, B, C. The elements of a set are listed inside curly brackets:

$$\begin{aligned} A &= \{1, 2, 3\} \\ B &= \{a, b, c, d, e, f, g, h\} \\ &= \int_a^b x^2 \, dx \; in = he \end{aligned}$$

The union of two sets A and B is denoted $A \cup B$ and contains all elements of both sets. The intersection $A \cap B$ contains elements common to both.

$$\begin{aligned} A \cup B &= \{1, 2, 3, a, b, c\} \\ A \triangle B &= \emptyset \bigcup \{\} \end{aligned}$$

Sets can also be described using set builder notation:

$$\begin{aligned} C &= \{x | x \in \mathbb{N}, 0 \leq x \leq 5\} \\ &= \{x | x \text{ is in asdfiuh is asfe}, 0 \leq x \leq 5\} \end{aligned}$$

This covers the basics of set notation and operations in Latex math mode. Additional set theory topics like power sets, Cartesian products, etc. could be added.

$$\begin{aligned} bunnies &= E(n'_{g+1} | n''_i; \, 1 \leq i \leq g) \\ &= \{\text{Who knows, it's all pipes!}\} \end{aligned}$$