LaTeX Intro Session

Jason Sinaga

Spring 2023

1 Logical Operators

Let's start off with some logical operators

- The logical and $\wedge$
- The logical or $\vee$
- The implication $\implies$
- The negation $\neg$
- The biconditional $\iff$

In addition to these, you will also be learning about existential and universal quantifiers.

1. $\forall$ is an upside down A
2. $\exists$ is an inverted E

2 Inequalities

In CS/Math 240, you will also be dealing with some polynomials when you are trying to prove whether something is increasing or decreasing. Take this inequality for example

$x^2 + 3x + 6 \geq 0$

In addition to polynomials, you will encounter some crazy exponents like the one below

e^{x^2} and even expressions such as $e^{\frac{x^2}{y^3}}$

3 Sets

You will also be learning about sets, and so these symbols would be necessary.

We can say that $x \in \mathbb{Z}$ if x is an integer.

We can also write statements like this that show whether an element does not belong in a set like how $0.45 \notin \mathbb{N}$

We can denote the union of sets A and B as $A \cup B$. We can denote the intersection between them as $A \cap B$. The difference between them is AB. We can also denote subsets as $A \subseteq B$

4 Greek Symbols

Did you know that you would also be dealing with Ω and Θ? This would be used for growth rates of functions. If you've taken CS300, you may have some familiarity with this.

5 Functions

Eventually, this is how you would denote a function and how it would be mapped.
$f : x \to g : y$

Thus, you can write $f(x) = \frac{x}{21} + 3$. You can also write the inverse of a function such that $f^{-1}(x) = 21x - 3$. When dealing with composites of functions $f(x)$ and $g(x)$, we can use symbols to show their relationship as $(f \circ g)(x)$

6 Sums, Sequences and Binomials

When you learn proofs by induction (sounds scary, huh), you will use sums. So let's try to write this down.

$$\sum_{n=0}^{\infty} i \times 2^i$$

You will also encounter some sequences, and you can write them like this

$$c_{n+1} = c_{n-2}^{3^n}$$

When you eventually reach combinatorics, you will use factorials and binomials. Factorials is straightforward since it's just !. Now let's make a binomial of 5 choose r times 4 choose $n - r$.

$$\binom{5}{r} \times \binom{4}{n-r}$$

7 A random picture of your choice

Let's find a random picture, put it in your Overleaf folder, and give a caption to it.

Figure 1: This is a picture of Donald Duck posing (Kingdom Hearts 3).

8 Variables

Here are some values that are assigned to variables. $x_0 = 3(k + 1)$. Now can you prove that there exists a value k such that $x_0 \mid 234521$? ($\mid$ means divides)

9 Graphs

Last but not least, let's make a graph. Let's make an undirected one.