

August 29, 2025

LaTeX Template
MATH 300, Fall 2023

This is a very brief resource for LaTeX in our class. It is intended that you look at the output of this file (the .pdf you are reading) and also the source (a .tex file which can be opened in any text editor or online in Overleaf—see below).

First, some resources for beginning with LaTeX:

- (Downloading LaTeX) This link will allow you to download a (large) LaTeX package for your computer, no matter what system you run: <https://latex-project.org/ftp.html>.
- (Using LaTeX in the Cloud) This link will allow you to create an account (for free) and use LaTeX hosted on a server. This has become the most popular way to use TeX. <https://www.overleaf.com/>.
- (Finding Difficult Symbols) This link allows you to draw in a symbol and it returns the appropriate LaTeX source for that symbol. A life-saver: <http://detexify.kirelabs.org/classify.html>

In the statements you find below, you should be able to “mine” the source code for the first few assignments.

- $s \in S$; $r \notin S$; $S \subseteq R$; $S \subsetneq P$; $P \subset R$ (Let’s agree to use \subset and \subseteq in this class.)

- If p then q , $p \implies q$; p if and only if q , $p \iff q$

- $\forall x \exists P(x)$ such that

$$\exists! S \subsetneq P(x), \text{ and } S \neq \emptyset$$

- A cool “set”:

$$\mathcal{S} \equiv \{S \text{ a set} : S \notin S\}$$

- Let S be a set such that $S \neq \emptyset$. Define the set $\overline{S} \equiv \{S, \{S\}\}$. Then $S \in \overline{S}$ and $S \subseteq \overline{S}$.

- Let \mathcal{U} be the universe of consideration and $A, B \subseteq \mathcal{U}$. Then

$$A \triangle B \equiv (A \cap B') \cup (B \cap A') = (A - B) \cup (B - A). \quad (1)$$

- A finite set S has the property that $|S| < +\infty$.

- We will use the conventions that $\mathbb{N} \equiv \{1, 2, 3, 4, \dots\}$ and $\mathbb{W} \equiv \{0, 1, 2, 3, \dots\}$.
- Each of the following sets is not finite:

$$\mathbb{N} \subset \mathbb{Z} \subset \mathbb{Q} \subset \mathbb{R} \subset \mathbb{C}.$$

- $\sim (p \implies q)$ is $p \wedge (\sim q)$; $\sim (p \vee q)$ is $(\sim p) \wedge (\sim q)$
- My favorite Greek symbols are:

1. Υ
2. β
3. Γ
4. ξ
4. ζ

The last two are tied.

- Some standard notations:

- $[0, 1], (0, 1), [0, 1)$
- $\int_0^T f(t) dt, \int_0^T f(t) dt$
- $\frac{d}{dx} f; \frac{df}{dx}$
- $\lim_{x \rightarrow \infty} g(x); \lim_{n \rightarrow \infty} g(n)$

For $p, q \in \mathbb{Z}$ we say $p \mid q$ if and only iff $\exists m \in \mathbb{Z}$ such that $q = p \times m$. If this does not occur, we say $p \nmid q$.

- There are environments for Theorems and Proofs:

Theorem 1. *Suppose that everyone has their wits about them. Then True Grit will the Presidential election.*

Proof. I mean, it really is that obvious. □

There are also environments for things like Lemmas and Corollaries. There are no environments for Llamas. Sorry.