MATH 3283W
TEX project template

Author's Name

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1 Section Title

The odds are that you won't need sections in your writing project, but this template includes a few section headers, so that you can see how LaTeXautomatically numbers them.

Perhaps you need to write things in a list:

- like
- this
- here

Or maybe you need a list with numbers.

1. like
2. that
   (a) you can even
   (b) have lists within lists!

2 Second Section

You can do math mode in the middle of the line, like this $x + y = 5$, or you can do "displaymath" mode to get a separate line of math, like this:

$$x + y = 5.$$

3 Third Section

Here are some more useful mathmode symbols. Some of the code below uses the command `\quad`, which inserts a bit of extra space in math mode.

- $\mathbb{Z}$, $\mathbb{N}$, $\mathbb{R}$
- x_{n+1}, $\quad x^{5+y}$
- $\frac{4}{z-2}, \dfrac{4}{z-2}$
- $\epsilon, \varepsilon, \delta, \Delta$

- $\in$, $\notin$
- $\subset$, $\subseteq$, $\subsetneq$
- $\neq$, $\leq$, $\geq$
- $\to$, $\rightarrow$, $\leftarrow$

Here are some more... but notice that sometimes things don't look as nice as you want them to... so use `\displaystyle` in math mode to make the symbols larger.

- $\int_1^\infty x^2\,dx$ vs. $\displaystyle\int_1^\infty x^2\,dx$
- $\sum_{i=1}^\infty e^{i^2}$ vs. $\displaystyle\sum_{i=1}^\infty e^{i^2}$
- $\lim_{n\to\infty} \frac{a_n}{n} = 0$ vs. $\displaystyle\lim_{n\to\infty} \frac{a_n}{n} = 0$

In contrast to Google Docs, LaTeX can make just about anything look beautiful and professional. For instance, multi-line equations:

$$\begin{aligned} |x-y| &\leq |x| + |y| \\ &< \frac{\epsilon}{2} + \frac{\epsilon}{2} \\ &= \epsilon \end{aligned}$$

There are lots of other things you can do within Latex! Many of them you can figure out by googling your question and the word `latex`. Try googling "piecewise function latex" with no quotes.

4 Useful Tool

You might find the website `http://detexify.kirelabs.org/classify.html` useful. You can draw symbols and it will tell you the LaTeXcode for them. Another useful online reference is `http://en.wikibooks.org/wiki/LaTeX/`.

5 Professor Mosher's List of Symbols

Professor Mosher wrote a long template document with many mathematical symbols. There's some overlap with what has already been written above, but because it is so comprehensive it is included for your benefit here.

5.1 How to state a problem

Here is a way to format the statement of your problem:

2.1 #20. Prove that $A \cap B$ and $A - B$ are disjoint and

$$A = (A \cap B) \cup (A - B).$$

Proof: Here is where your solution will go. □

What follows are symbols that might be relevant to this course. It's definitely not complete in any sense. Delete all of this in your project submission, of course. You can also search the internet – google "latex if and only if" and you'll quickly see the TeX command

`\Leftrightarrow`

which produces $\Leftrightarrow$.

6 Logic and proof

Here are some logical connectives: $\sim p$, $p \wedge q$, $p \vee q$, $p \Rightarrow q$, $p \Leftrightarrow q$.

Here is how you make a table:

p	q	$p \Rightarrow q$
T	T	T
T	F	F
F	T	T
F	F	T

Here are some quantifier symbols:

$$\forall x, \exists y \ni x < y.$$

7 Sets and functions

Here is some set notation: $x \in A$, $x \notin A$, $A = B$, $A \neq B$, $A \subset B$, $A \subseteq B$, $A \not\subseteq B$, $A = \{1, 2, 3, 4\}$, $\mathbf{R}$, $\mathbb{R}$, $\mathbf{Q}$, $\mathbb{Q}$, $\mathbf{Z}$, $\mathbb{Z}$

$[0, \infty)$, $\emptyset$, $\varnothing$

$\mathscr{A} = \{A_i : i \in \mathbb{N}\}$

$$\bigcup_{i=1}^{\infty} A_i$$

$$\bigcap_{i \in \mathbb{N}} A_i$$

$A_1 \cup A_2 \cup \cdots A_3 \cup \cdots$

$$A \times B = \{(a, b) : a \in A \text{ and } b \in B\}$$

$\langle 2, 4 \rangle \in (1, 3) \times (3, 5)$

$f : A \to B$, $g : B \to C$, $g \circ f : A \to C$

$f^{-1} : B \to A$.

$g(x) = \sqrt{x - 1}$

$h(x) = \sqrt[3]{x - 1}$

$f(x) = \sin x$

$f(x) = 1/x$

$f(x) = \frac{1}{x}$

$$f(x) = \frac{1}{x}$$

$f(x) = 2x^{12} + 3x^3 - \pi$

$$b_n = \begin{cases} 2, & \text{if } a_{nn} \neq 2, \\ 3, & \text{if } a_{nn} = 2. \end{cases}$$

$|S| \leq |T|$
$|S| < \aleph_0$
$\mathscr{P}(A)$
$\mathcal{P}(B)$

8 Natural numbers

$$\frac{1}{3} + \frac{1}{15} + \cdots + \frac{1}{n(n+1)} = \frac{n}{n+1}, \text{ for all } n \in \mathbb{N}.$$

$$\binom{n}{r} = \frac{n!}{r!(n-r)!}$$

$\sup f(D) \leq \inf g(C)$

$$\left\{ \frac{n}{n+1} : n \in \mathbb{N} \right\}$$

$\left\{ \frac{n}{n+1} : n \in \mathbb{N} \right\}$

$\{ \frac{n}{n+1} : n \in \mathbb{N} \}$
Let $\epsilon > 0$.
Let $\varepsilon > 0$.
For all $\varepsilon > 0$, there exists $N \in \mathbb{N}$ such that if $n > N$, then ...
For all $\varepsilon > 0$, there exists $\delta > 0$ such that ...
$A = \partial B$
$A = \overline{B}$
$A = \mathring{B}$

9 Sequences

$$\lim_{n \to \infty} a_n = 1.$$

$$\left| \frac{1}{t_n} - \frac{1}{t} \right| < \varepsilon.$$

$$s_n = \sqrt{1 + \sqrt{1 + \sqrt{1 + \cdots}}}$$

$$s_m - s_n > \underbrace{\frac{1}{m} + \frac{1}{m} + \cdots + \frac{1}{m}}_{m-n \text{ times}} = \frac{m-n}{m}$$

10 Series

$$s_n = \sum_{k=0}^{n} r^k$$

$\sum a_n = +\infty$.

$$\int_1^n \frac{1}{x^p}\, dx$$

$\int_1^n \frac{1}{x^p}\, dx$