A LATEX PACKAGE DEMO

YOUR NAME

ABSTRACT. This is a latex starter for It is based on the template developed for the REU program at the University of Chicago.

CONTENTS

1. WHAT DOES THE TABLE OF CONTENTS COMMAND DO?

The table of contents command will automatically make a contents; if your document is short, you probably don't need a table of contents. You must run tex at least twice for this to work.

2. HOW DO THE ENVIRONMENT COMMANDS WORK?

"Environments" are commands that are given using the `\begin{}` and `\end{}` syntax. In the preamble, you can see we've defined a bunch of theorem-type environments, including, for example "`defn`" To get a definition, you type:

Definition 2.1. This is how to define a definition.

And for a theorem and its proof you would type:

Theorem 2.2. *This is the statement of a theorem.*

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Proof. And this shows that the statement is correct. □

Note that the numbering is taken care of automatically, and that we've predefined a bunch of these sorts of environments to take care lemmas, corollaries and such in the header.

2.1. **Displaying equations.** Another useful kind of enviroment is the equation environment. Equations get numbered in sequence with statements, as for example

$$e = mc^2 \tag{2.3}$$

Note if you do not want a numbered equation, you can use the environment "`equation*`" like so:

$$e = mc^2$$

For multiline equations, use "`align`" or "`align*`":

$$\begin{aligned} (x+y)^2 &= (x+y)(x+y) \\ &= x(x+y) + y(x+y) \\ &= x^2 + xy + yx + y^2 \end{aligned} \tag{2.4, 2.5}$$

There are plenty of other equation-type enviroments that allow you to align several equations and such. The AMS's guide [1] is a good place to start with these.

2.2. **Inline math mode.** You can also typeset math directly in a paragraph by placing it within \$dollar signs\$ or \(backslash round brackets\). This is called "inline math mode." For example: Let e be energy, m be momentum and c be the speed of light. Then Einstein's famous equation says that $e = mc^2$. You should use inline math mode whenever you use a variable name or math symbol in text. This distinguishes variables a or i from words such as a or i. For longer equations, you should use "display math mode".

2.3. **Display math mode.** Displayed math is typset on a separate line, and centered, such as

$$e = mc^2.$$

To display math, enclose it in \[backslash square brackets\]. Remember that you should include appropriate punctuation in displayed math.

2.4. **Symbols.** Both [3] and [1] have good lists of symbols you can use in math mode. These include greek letters ($\alpha, \beta, \Gamma, \Delta$), operators ($\otimes, +, \sum$) and much more ($\leq, \diamond$). Note that some symbols are slightly different depending on whether they are used inline or displayed.

2.5. **Further comments on text.** If you want to *emphasize* something in your text, use `\emph{}`. For **boldface**, *italics*, `monospace`, and SMALLCAPS, use `\textbf{}` `\textit{}`, `\texttt{}`, and `\textsc{}`. These should be used *very sparingly*.

Also note the formatting of "quotation marks" – this requires using ` ` (two backticks) to open the quotation, and a usual quotation mark (or two apostrophes) to close. If you just use the quotation mark key on your keyboard, you'll get something that "looks silly".

Cross-references are produced with `label/ref` pairs. Put `\label{somename}` next to what you want to reference, and then use `\ref{somename}` to reference that item. For example, the section on environment commands is 2, and it contains a theorem numbered 2.2. Latex must be run twice to correctly detect and print cross-references.

The `cref` package provides the command `\cref`, which automatically includes the name of the environment. So you can refer to Theorem 2.2 or Section 2. It also properly handles multiple references, such as Displays (2.3) and (2.5).

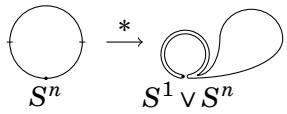
3. XYPIC AND DIAGRAMS

If you want to draw diagrams, you could use xypic. It's actually much easier than it looks, and we've already included it in the header above. Here is an example.

$$\begin{array}{ccc} FX & \xrightarrow{Ff} & FY \\ {\scriptstyle \eta_X}\downarrow & & \downarrow{\scriptstyle \eta_Y} \\ GX & \xrightarrow[Gf]{} & GY \end{array}$$

4. TIKZ FOR MORE COMPLEX DRAWINGS

TikZ is somewhat more full-featured than xypic. It has an extensive manual, a large online community, and a steep learning curve. Here's one example diagram:



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REFERENCES

[1] Michael Downes. Short Math Guide for LaTeX. ftp://ftp.ams.org/pub/tex/doc/amsmath/short-math-guide.pdf
[2] J. P. May. A Concise Course in Algebraic Topology. University of Chicago Press. 1999.
[3] Tobias Oekiter, Hubert Partl, Irene Hyna and Elisabeth Schlegl. The Not So Short Introduction to LaTeX 2_ε. http://tobi.oetiker.ch/lshort/lshort.pdf.

YOUR ADDRESS
E-mail address: you@example.com
URL: http://nilesjohnson.net