ISC 2021 LaTeX Basics

ISC 2020

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This document shows off some of the features of LaTeX. First, to display words in the output PDF, we simply type them into the body (the space between `\begin{document} \end{document}`). Now, if we put a single newline between two pieces of text, it has no effect! The text is simply concatenated together as if we continued on the same line.

However, with, two newlines, we do see an effect. Two newlines starts a new paragraph, which LaTeX automatically indents.
This can alternatively be done with a double backslash (\\), but we don't get the indentation.

Or, with the command `\par` (for paragraph!), we get the newline and the indentation.

Notice how the commands we've been using all involve the backslash (\)? That's because the backslash is a *reserved character*, just like the semicolon in java. The backslash will begin every command in LaTeX. Arguments of the commands will normally be surrounded by curly braces.

To do more formatting, we can use commands. It's not like Microsoft Word, where what you see is what you get (wysiwyg). We can't just turn on italics. Instead, we use the command `\textit`. *This text is italicized!*. **This text is bold face, using the command** `\textbf`. If we just want to emphasize some text, we can use `\emph`. This command makes the *text stand out* from the surrounding text. *So, if we're in italics, and we want* some text to stand out*,* `\emph` *will de-italicize it!* **Similarly, in bold face, text that *stands out* will be italicized.**

In addition to commands, LaTeX has structures called *environments*. Environments can do a lot of things:

1. Like make this numbered list!
2. Or make it really easy to typeset math (perhaps the most distinctive feature of LaTeX) like $a^n + b^n \neq c^n \ \forall \ n \geq 3$.
3. Or add plots and pictures with captions (examples of which you can see in the sample labs).

Notice that we use the command `\item` in enumerate to create another numbered point. If you want an unlabeled list, you can use the environment `itemize`. It too uses the `\item` command.

Back to the math mode we were describing earlier. There, we used a shorthand to enter *inline math mode*–single dollar signs on either side of the equations causes LaTeX to enter math mode. If we use double dollar signs, we can enter the display math environment which puts math on a separate line:

$$\forall\ x \in \mathbb{Z},\ x \mid 0.$$

There are other more advanced math modes that exist (look at the amsmath package and its align environment for starters).

One last environment is worth explicit mention here. The *verbatim* environment is the easiest way for you to enter your MATLAB code, which you will be required to do for your labs. Here's an example:

```
This environment uses a different font that is monospaced (makes code
easier to read). It also gets rid of all protected characters,
so you can backslash \\ and curly brace {} freely.

Even more importantly, the percent sign (%), which is used to
comment lines in both MATLAB and LaTeX, no longer has any power.
We can also start newlines by inserting a newline--this environment
is much more wysiwyg.

However, that leads to pitfalls, like lines that run off the page page page page page pa
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Back at the beginning of this document, we talked about the body of the document. The space before the `\begin{document}` is known as the preamble—in it, you can define commands, tell LaTeX what packages to use and insert the title. However, to make that title display, we must put the command `\maketitle` at the beginning of the body. At the very beginning of the document, we use the `\documentclass` command, which tells LaTeX how to format the whole file. In almost every case, you will use the article class. If you decide to use Jake Waksbaum's lab document class, you can replace the argument `article` with `lab`.

One quick note about a command that has been scattered throughout this document: the `\verb` command enters an inline *verbatim* mode. To enter the arguments, we use exclamation points (!) instead of curly braces (), since the curly brace is no longer protected. The author of the document suspects you will *NEVER* need to use this command. To enter code, use the verbatim environment.