

## *Overview of LaTeX*

### 1. What is LaTeX?

LaTeX is a word processing program (really several programs) for scientific typesetting. It is used primarily in Math and Physics, although other disciplines will use it occasionally.

### 2. Why LaTeX?

This is a free, machine-independent word processing package designed for mathematics. Other programs, such as Microsoft Word, were not put together with this in mind (although they do have add ons, such as the Equation Editor, to try to deal with math). LaTeX will produce professional looking documents.

If you have a PC running Windows, you can download a version of LaTeX called Miktex, but this is beyond the scope of these notes.

### 3. How does LaTeX work?

- To produce a document using LaTeX, you first create a simple text file using any text editor (this is why LaTeX is machine independent). This file contains typesetting commands, text, and commands to produce mathematical symbols, equations, and you can include external graphs.
- Once the text file has been created (usually with a \*.tex suffix), you run a program (**latex file.tex**) to convert the text into a mathematics document (with a \*.dvi suffix).
- You can now view or print the document using another program (**xdvi file.dvi**). You can also convert the document into other types, such as Adobe Acrobat PDF, or HTML.

## A First LaTeX Document

### 1. Open a text editor.

### 2. The following lines are *required* in LaTeX and will appear in every LaTeX file:

```
\documentclass{amsart}
```

```
\begin{document}
```

```
\end{document}
```

3. Now fill in some text. The following is a statement of the Mean Value Theorem. This also shows you the format you'll use in writing up your labs.

```
\documentclass{amsart}

\title{The Mean Value Theorem}
\author{Your Name(s) Go Here}

\begin{document}

\maketitle

{\bf THE MEAN VALUE THEOREM.} Let  $f$  be a continuous function on the
interval  $[a,b]$ , and differentiable on  $(a,b)$ . Then there is a  $c$ 
in  $(a,b)$  so that:

$$f'(c) = \frac{f(b) - f(a)}{b - a}$$

\end{document}
```

4. Save this file as `MVT.tex`
5. Compile by typing the command: `latex MVT.tex`
- If successful, you will see some text fly by, and will have created the file `MVT.dvi`.
- If you were not successful, the program will stop with a ? To continue, type `x` and hit Enter. We'll talk about debugging your file later.
6. To view the end result, type: `xdvi MVT.dvi` and you should see something like this:

**THE MEAN VALUE THEOREM.** Let  $f$  be a continuous function on the interval  $[a, b]$ , and differentiable on  $(a, b)$ . Then there is a  $c$  in  $(a, b)$  so that:

$$f'(c) = \frac{f(b) - f(a)}{b - a}$$

You should look at what you typed above to see how LaTeX created the end result. Let's look at it feature by feature:

- To create boldface text, we used: `{\bf text }`
- To set off mathematics variables and put them within a line of text, use single dollar signs: `$ math text $`
- To set off mathematics on its own line, use double dollar signs:  
`$$math equation$$`
- A fraction was created by: `\frac{ numerator }{ denominator }`

- Regular text doesn't need anything special, unless you want it to be a title or something.

A template for your labs: Type in the following, and save it as `template.tex` so that you can use it later:

```
\documentclass{amsart}
\usepackage{graphicx}

\title{Put Your Lab Title Here}
\author{Put Your Name(s) Here}

\begin{document}

\maketitle

\section{Introduction}
```

Here, you will set up the problem and the notation you'll use.

```
\section{Discussion}
```

Here, discuss your solution and include graphs and tables where necessary.

```
\section{Conclusions}
```

Conclude by answering the question.

```
\end{document}
```