INTRODUCTION TO LATEX

Version 3.2.08

1. Templates, from simple to complex

1.1. **The basic form.** Here's the format of a simple document:

```
\documentclass{amsart}

\begindocument

[put stuff here]

\end{document}
```

Comments:

- The first line tells what type of document this is. "amsart" is the right kind for most mathematical work.
- Using `\documentclass[12pt]{amsart}` puts the document in 12 point (larger) type. The default is 10 point.
- Start a new paragraph by leaving a blank line.
- Put mathematical expressions between $ signs, for example `$ x = -y $` . (In *The Texbook*, Knuth's original book on Tex, he says "because mathematics is supposedly expensive".) To display an equation, put it between double $ signs, for example `$$ x^3 = y^2 $$`.

1.2. **Adding a title and author.** After `\documentclass` but before `\begin{document}` put the following:

```
\title{ [your title] }

\author{ [your name] }
```

Then after `\begin{document}` put:

```
\maketitle
```

Your title and author name will appear at this point.

1.3. **Adding definitions, theorems, etc.** After \documentclass but before \begin{document} put the following:

```
\theoremstyle{plain}

\newtheorem{theorem}{Theorem}
```

(If you want, put more things here like "proposition", "lemma", "corollary", etc.)

```
\theoremstyle{definition}

\newtheorem{definition}{Definition}
\newtheorem{conjecture}{Conjecture}


\theoremstyle{remark}

\newtheorem{example}{Example}
```

Comments:

- \theoremstyle{plain} is the most emphatic. It sets the enviroments following it in italics.
- \theoremstyle{definition} is medium emphatic. It sets the following environments in roman (ordinary) type.
- \theoremstyle{remark} is the least emphatic. For more on "theoremstyle" see Grätzer p. 139.

Under each of these headers you put the "newtheorem" command with the items you want typeset this way. I made some suggestions above, but I'd say just play around with these until they look the way you want.

Put \begin{theorem} before the statement of a theorem, and \end{theorem} at the end, and similarly with definitions, etc.

1.4. **Sections.** Use

\section{ [put name of section here] }

if you want to divide your paper into sections. There are also sub- and subsubsections. For example, "Latex with Winedt" below is a section, and "Sections" above is a subsection. Note that everything is automatically numbered.

2. **Latex with Winedt**

Start the program WinEdt. To start a new latex file, do the menu item "File/New". (The menu item "Document/New Document" starts a document which has a rather large template. My feeling is that it's better to start with something simple and then gradually make it more complex as needed.) Enter it and save it.

The first time you tex the file, do the menu item "Project/Set main file". This is to tex the document you're working on. Then press the "Latex" button (not the "Tex" button).

A black window will come up which describes the process of the latex program. If there's an error the program will stop and you'll have to find out why it stopped. This can be tricky and it's best to talk with a more experienced person in this case.

When the document goes through ok, press the "DVI" button to see what it looks like. Also you can print it from this window.

3. **Some commonly used commands**

(1). The environment

```
\begin {center}
```

[put stuff here]

```
\end {center}
```

will center non-math material. For mathematics, use either double $ signs or the pair \[math stuff here \].

(2). The symbol % in front of a line makes Latex ignore the rest of that line.

(3). Many aligned environments are possible in Latex; for a pictorial summary see Grätzer p. 204. The simplest is the "align" environment which lines up items vertically. Use this for mathematics. Do not surround it by $ signs.
Here's an example. If you type in:

```
\begin{align*}
x + w & = y + z \\
x + a + b & = y \\
x & = y + z + u
\end{align*}
```

then this will come out as:

$$\begin{aligned} x + w &= y + z \\ x + a + b &= y \\ x &= y + z + u \end{aligned}$$

The ampersand is the alignment point. Note that they don't need to be lined up in the source code. Also note that there is no double blackslash after the last line. Finally, `align` produces equation numbers for each line, whereas `align*` leaves them out. (This is true of many environments: put in an asterisk to eliminate the line numbers.)

(4). For vertical space use \smallskip, \medskip, and \bigskip. For horizontal space use \, \quad, and \qquad.

(5). To put text into a math environment, use

`\mbox{ ... text ...}`

(6). Here's an example of how to make a simple table:
If you type in:

```
\begin{center}
\begin{tabular}{ | l | l | l | }
\hline
a & b & c \\ \hline
cc & dd & ee \\ \hline
fff & ggg & hhh \\ \hline
\end{tabular}
\end{center}
```

the following comes out:

a	b	c
c	dd	ee
fff	ggg	hhh

Comments: The ampersands here signify a new box. The command `\hline` draws a horizontal line. The expression `{ | l | l | l | }` after `\begin{tabular}` means to flush the items to the left.

The following table summarizes some common commands.

Latex command	will print as	Comments
`(`	$($	
`\big(`	$\big($	
`\Big(`	$\Big($	
`\bigg(`	$\bigg($	
`\Bigg(`	$\Bigg($	
`\mod{n}`	$\mod n$	
`\pmod{n}`	$\pmod n$	

Similar commands work for other delimiters, for example [and { etc.

4. **Additional symbols**

Appendix A in "Math into Latex" by Grätzer has large tables of mathematical symbols like these:

$$\clubsuit, \aleph, \Upsilon, \nexists, \spadesuit, \ddot{\ddot{a}}$$

and in Appendix B you can find many text symbols such as

æ, ⓐ

To get some of these these symbols I had to add the "usepackage" command as shown below. (Look in Grätzer to see which symbol came from which package.) I just put all three packages there for simplicity.

```
\documentclass{amsart}
\usepackage{latexsym, amssymb, amsmath}
```

5. **A final question**

I did this document in Latex. How did I make it look like this?