Introduction to Scientific Typesetting
Lesson 1: Getting Started

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An Overview

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Word Processors vs. LaTeX

The Weaknesses of Word

- WYSIWYG programs combine *composition* and *typesetting*
  - most Word users don't know much
  - may lose logical structure of a document
- bibliographies, cross-references, figure labels must be completed *by hand*
- different versions mean compatibility issues
- cost!

Even worse . . .

Word is *terrible* at math!

The History of LaTeX

- TeX
  - Donald Knuth, 1978 (frozen in 1989)
  - frustrated at result of Art of Computer Programming, realized high quality digital typesetting system was necessary
- LaTeX
  - Leslie Lamport, early 1980s (manual published in 1986)
  - needed macro package on top of TeX
  - has become the standard

The Strengths of LaTeX

- portability and compatibility—text files!
- very flexible
- cost (free!)
- consistency throughout document
- allows you to focus on content
- automation of tedious tasks (cross-references, bibliographies, etc.)
- radical, global changes can be implemented consistently with very little work
- decision-making about formatting can be left to an expert (or not)

The Weaknesses of LaTeX

- undeniable learning curve
- complex formatting may occasionally take more time than a word processor (e.g., tables)

What is LaTeX?

- LaTeX is a *markup language* — think HTML
- all work is done in text files
- LaTeX then processes this file *in its entirety* and decides how best to typeset the document
- the output is either a device-independent file (DVI) or a PDF; a DVI can be converted easily to postscript (.ps) or PDF

▶ You must remember that LaTeX is *not* a word processor!
Don't expect it to behave like one.

Our First LaTeX Document

Setting up MikTeX

The first thing we need to do is set the proper paper size within MikTeX. (The default is A4, which is a size used more in Europe than the U.S.)

1. Find the “MikTeX 2.9” folder from the Start menu.
2. Choose “Maintenance,” then “Settings.”
3. In the middle of the window, set “Letter” to be the default paper size. (Note: do **not** choose the “letterSize” option.)

You’ll want to do this when you install MikTeX on your machine too.

TeXnicCenter

TeXnicCenter is a free text editor that has very tight integration with LaTeX. It was dormant for a while, but development has recently resumed.

1. Open TeXnicCenter from the Start Menu.
2. You'll have to tell TeXnicCenter where to look for the LaTeX files. For this computer lab, the location is:

```
C:\Program Files (x86)\MiKTeX 2.9\miktex\bin
```

The Text of Our First File

1. Create a new document.

```
\documentclass{article}

\begin{document}
Hello, world!
\end{document}
```

2. Save your document. (You might want 1 document per folder.)
3. Make sure that `LaTeX=>DVI` is in the "build" box.
4. "Build" your document. (Ctrl + F7 or use mouse.)
5. View your document. (F5 or use mouse.)

Congratulations!

Errors

When Things Aren't Perfect

Errors are written on a "log" file. TeXnicCenter displays this at the bottom of the window.

Type this—it will produce an error.

```
\documentclass{article}

\begin{document}
\includegraphics{globe.eps}
Hello, world!
\end{document}
```

Finding Errors

You should see the following at the bottom of your window:

```
LaTeX-Result: 1 Error(s), 0 Warning(s),
0 Bad Box(es), 1 Page(s)
```

1. Press F9.
2. TeXnicCenter will take you to the error and try to explain it. (Sometimes this is difficult to understand, but you'll get the hang of it.)

   Errors aren't always "fatal," but sometimes they are.
3. You may occasionally need to pay attention to the "Warnings," but not usually.

The Structure of a LaTeX Document

Document Structure

Here's the basic idea:

`\documentclass{article}`	Preamble

`\begin{document}`
`Hello, world!`
`\end{document}`
	Body

Everything before `\begin{document}` is called the "preamble."
Everything in the "document" *environment* is called the "body."

The Basic Rules

Preamble

This is where you tell LaTeX how you want your document handled.
A book? An article? Margins? Etc.
(We will discuss preamble commands a lot.)

Body

This is where the text of your document goes.

Digging Beneath the Surface

Special Characters

Remember, LaTeX is *not* a word processor!

Everything after % on a line is called a “comment” and will not show up. This can be really helpful in making notes to yourself!

Other special characters:

$$\# \quad \$ \quad \& \quad \sim \quad \_ \quad \hat{} \quad \backslash \quad \{ \quad \} \quad |$$

This means that if you want to produce these characters, you need some special code. For example,

type “\&” in order to see: &.

There will be a list of the commands needed for this in one of the documents on Sakai.

Spaces in the Source File

Two or more spaces in text are the same as one. Within the body of document, the following give the same output:

```
Hello world!
Hello      world!
```

Additionally,

- A tab or end-of-line character is the same as a space.
- A blank line indicates the end of a paragraph.
- Two or more blank lines are the same as one.
- Spaces at the beginning of a line are ignored.

Don't get carried away with the freedom this offers. It is important to maintain the readability of your source file!

Periods

Rule: A period after a capital letter signifies an abbreviation or an initial. Every other period signifies the end of a sentence.
This rule works most of the time.

Follow-up Rule: If an abbreviation does not end with a capital letter and is not the last word in the sentence, then follow the period with an interword space (\␣) or a tie (~).

Examples:

- ```
  ...birds like ducks,
  geese, etc.\ are my favorite...
  ```
- ```
  Dr.~Smith told me that I had a cavity...
  ```

More with Periods

Another Rule: If a capital letter is followed by a period and is at the end of a sentence, precede the period with `\@`.

```
Make sure to take your vitamin C\@.  It will
        help you fight your cold.
```

Last Period Rule: Add thin space (`\,`) or no space within strings of initials and be consistent.

- `R.\,S. Higginbottom`
- `R.S. Higginbottom`

Environments and Commands

Environments

Anything between
`\begin{name}`
and
`\end{name}`
is called the *content* of the environment.
Then “name” would be the *name* of the environment.

We’ve already seen one environment: the document environment!
The body of the article is the content of the document environment.

We’ll discuss some text environments shortly.

Commands

Usual syntax for a command is:

```
\commandname[options]{argument}
```

Arguments are mandatory; options are optional.
Note that arguments are enclosed in braces, options (or optional arguments) are enclosed in brackets.

An example:

```
\includegraphics[rotate=90]{globe.eps}
```

Symbols of Interest

Quotation Marks

You'll need the left-quote button (usually the same button as the tilde) and the right-quote button to make quotations.

```
‘Where do we go?’
‘‘Where do we go?’’
```

If you need both, you might want to separate them:

```
‘‘She asked, ‘Where do we go?’\,’’
```

Dashes

There are three lengths.

- hyphen Type this with a single dash:

```
type:  third-world country
 see:  third-world country
```

- *en dash* This is used for number ranges (and other things). Type with two dashes

```
type:  office hours are 3--4
 see:  office hours are 3–4
```

More on Dashes

- *em dash* This is used to mark an abrupt change in thought or to add emphasis. Type this with three dashes:

  type: `an aside---like this one---can be distracting`
  see: an aside—like this one—can be distracting

Other examples of em dashes:

- You are the friend—the only friend—who offered to help.
- Never have I met such a lovely person—before you.
- I wish you would—oh, never mind.

Examples taken from
`http://www.grammarbook.com/punctuation/dashes.asp`.

Practice

Look at the example `.pdf` file posted on Sakai and take some time to reproduce it using LaTeX. I'll be available to help you if needed.

Pay attention to the details!