

**22S:166**  
**Computing in Statistics**

**Introduction to L<sup>A</sup>T<sub>E</sub>X**

Lecture 3  
 August 28, 2006

Kate Cowles  
 374 SH, 335-0727  
 kcowles@stat.uiowa.edu

- `.dvi` files produced in L<sup>A</sup>T<sub>E</sub>X processing can be viewed on screen and printed on almost all kinds of printers
  - `dvi` is short for *device independent*
- particularly useful to academics; many journals now want electronic submission of manuscripts in L<sup>A</sup>T<sub>E</sub>X format

**Why learn L<sup>A</sup>T<sub>E</sub>X?**

- easy to produce professional-looking mathematical formulas
- easy to label equations, citations, figures, tables, etc. to automate cross-referencing
- can be used on any type of computer (PC, workstation, mainframe)
- freely available
- installed in many universities and research institutions
- `.tex` files are plain text: can be produced with any text editor and emailed to co-authors
  - doesn't require that all have same type of computer or same word-processing software

**Using L<sup>A</sup>T<sub>E</sub>X in the UI Mathematical Sciences educational laboratories**

1. prepare source file : `<name>.tex` in text editor
  - filename extension must be `.tex`
2. spell check source file:  
`ispell <name>.tex`
3. process source file:  
`latex <name>`
4. check that the following files exist: `<name>.log`, `<name>.aux`, `<name>.dvi`
5. view `.dvi` file (background job):  
`xdvi <name> &`
  - check document on screen before printing to save paper and money
6. convert `.dvi` file to Postscript (`.ps`) file:  
`dvips <name> -o <ps file name>.ps`

7. view .ps file (background job):  
`ghostview <ps file name>.ps &`
8. (optional) format multiple pages into a single sheet:  
`psnup -nup <number of pages> -m<margin size> <ps file name>.ps <new ps file name>`
9. (optional) convert .ps file to .pdf file:  
`ps2pdf <ps file name>.ps <pdf file name>.pdf`
10. (optional) view .pdf file (background):  
`acroread <pdf file name>.pdf &`
11. .dvi and especially .ps and .pdf files can be large, so smart to delete them when you're done using them
  - don't delete the .tex file!

Note: There is no need to restart the viewing application after you have modified a file. The content of these windows will be updated automatically, or by using File/Reopen or File/Open.

## Basic L<sup>A</sup>T<sub>E</sub>X

- current version of L<sup>A</sup>T<sub>E</sub>X is L<sup>A</sup>T<sub>E</sub>X 2 $\epsilon$ .
- previous version was L<sup>A</sup>T<sub>E</sub>X 2.09.
- lines that must appear in *every* L<sup>A</sup>T<sub>E</sub>X document:

```
\documentclass{ <class> }
\begin{document}
\end{document}
```
- classes of documents producing different default formats
  - article
  - report
  - book
  - slides
  - letter

## Sample .tex file

```
% articletemplate.tex

\documentclass[12 pt]{article} % statement required; 12 pt opti

%preamble
\usepackage[dvips]{graphics}
\usepackage{amssymb, amsmath}
\makeindex

% start document
\begin{document} % required

% article heading
\title{ Example of \LaTeX\ document }
\author{ Kate Cowles }
\date{ \today }
\maketitle

% \tableofcontents

\begin{abstract}
  This article demonstrates usage of basic \LaTeX\ feature

\end{abstract}
```

```
\section{Automatic paragraph formatting} \label{autoform}

  This is paragraph 1.

  To start a new paragraph, simply leave one or more
  blank lines. \LaTeX\ will do the indenting
  automatically. \LaTeX\ automatically indents the
  first line in all paragraphs except the first in a
  section.

  It doesn't matter how many spaces          you
  leave in between
  words or   where you break
  lines---
  \LaTeX\ considers a carriage return (where you pressed
  "Enter")
  as just another space between words.

\section{Special characters in \LaTeX} \label{specchar}

  The following characters are special codes in \LaTeX:
  \&, \$, \% , \^, \_ , \{, \}, \#, and \~. To print
  one of these characters literally, you must put a
  backslash before it. The backslash itself obviously
  also is a special character.

\subsection{\X} \label{pcntsign}
```

The percent sign is used to insert comments in a `{\tt .tex}` file. It tells `\LaTeX` to ignore everything that comes after it on the line. My most common error in `\LaTeX` is to forget to put the backslash before the % sign, so that several words are omitted from the output.

```
\section{Mathematical expressions} \label{mathexp}
```

Mathematical expressions may be included in the text of a paragraph by putting a dollar sign at the beginning and the end of each, like this: `$e = mc^2$`. The special backslash character is printed with `$$\backslash$`.

Alternatively, a mathematical expression may be set off on its own line like this:

```
\[
  e = mc^2
\]
```

Also, `\LaTeX` can number equations and keep track of the numbering for you, like this:

```
\begin{equation}\label{equa}
  e = mc^2
```

`\LaTeX` has two list environments:

```
\begin{itemize}
  \item bulleted lists
  \item numbered lists
      \begin{enumerate}
        \item differ from bulleted lists in th
              environment name
        \item lists can be nested within lists
      \end{enumerate}
\end{itemize}
```

```
\subsection{Tables}
```

The `{\tt tabulate}` environment formats the rows and columns while the `{\tt table}` environment provides captions, that i

```
\begin{table}[h]
  \begin{center}
    \begin{tabular}{ll}
      environment name & function \\
      \hline
      tabular & define rows, columns, titles \\
      table & add captions; make environment "floating" \\
      \hline
    \end{tabular}
  \end{center}
  \caption{Environments for Tables}\label{tabl}
```

```
\end{equation}
```

```
\section{Using labels} \label{labels}
```

Because we have used labels on our sections and equation, we can refer to them without having to remember the numbers ourselves. For example, `equation~(\ref{equa})` appeared in section `\ref{mathexp}`. This capability is particularly handy when we add sections or equations, or reorganize a document.

```
\section{Environments}\label{envi}
```

An `\emph{environment}` is a section of a `\LaTeX` document that is processed in a special way. Usually the section begins with

```
\begin{verbatim}
      \begin{ < environment name > }
\end{verbatim}
```

and ends with

```
\begin{verbatim}
      \end{ < environment name > }
\end{verbatim}
```

```
\subsection{Lists}
```

```
\end{table}
```

Options concerning table placement may appear in square brackets before the environment name `{\tt table}`. The choices are:

```
\begin{itemize}
  \item {\tt [h]} --- here (where typed in document)
  \item {\tt [t]} --- top of page
  \item {\tt [b]} --- bottom of page
  \item {\tt [p]} --- on separate page with other floats
\end{itemize}
```

```
\end{document} % required
```