STAT:5400 (22S:166)
Computing in Statistics

Introduction to LaTeX

Lecture 3
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Why should you learn LaTeX ?

- 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

- .dvi files produced in LaTeX 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 LaTeX format

Processing LaTeX documents (manual, step-by-step method when you have no graphics files or Postscript graphics to include)

1. prepare source file : `<name>.tex` in text editor
   - filename extension must be `.tex`

2. spell check source file:
   `ispell <name>.tex`

3. optional steps to be able to view changes as you make them
   - (optional) produce .dvi file:
     `latex <name>`
   - check that the following files exist: `<name>.log`, `<name>.aux`, `<name>.dvi`
   - (optional) view .xdvi file in background:
     `xdvi <name> &`

4. create PDF file:
   `pdflatex <name>`

5. (optional) format multiple pages into a single sheet:
   `pdfnup --nup <cols x rows > <pdf file name>.pdf`

6. (optional) view .pdf file (background):
   `evince <pdf file name>.pdf &`

7. `.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!

More on processing LaTeX documents

- integrated LaTeX text editing and document preparation environments
  - Emacs – for Linux; installed on Linux network
    * has add-ons to do the `latex` and `xdvi` steps
    * has macros to insert some LaTeX commands
    * also available for Windows; see Web Resources
  - Kile – for Linux; installed on Linux network
    * integrates processing of multiple file documents, including BibTeX
  - Texmaker and TeXnicCenter
    * TeXnicCenter – for Windows; installed on CSG-managed Windows machines

* Texmaker – similar to TeXnicCenter but for Linux; installed on DIVMS network

- different steps may be necessary for incorporating different kinds of graphics files into documents

More on doing LATEX in Emacs

- in the directory in which you wish to work, start Emacs

- use the File menu to either open an existing LATEX file or to "Visit new file"

- to set up to compile directly to pdf instead of dvi
  - Ctrl ctp (that is, hold down the Ctrl key while typing "ctp") to set this for the current session only
  - to make pdflatex the default, edit or create a file called .emacs in your home directory and place the following line in it:

```
(setq TeX-PDF-mode t)
```

Basic LaTeX

- current version of LaTeX is LaTeX 2_ε.

- previous version was LaTeX 2.09.

- lines that must appear in *every* LaTeX 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

%preamble
\usepackage{graphics}                 % if you will be incorpo
\usepackage{natbib}                   % if you need a bibliogr
\usepackage{url}                      % if you will cite URLs
\usepackage{amssymb, amsmath}         % extra math symbols
\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{\%} \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 backsl
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
      \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
\LARGE
    \begin{verbatim}
          \begin{ < environment name > }
    \end{ver*batim}


    and ends with

    \begin{verbatim}
          \end{ < environment name > }
    \end{ver*batim}
```

```
\subsection{Lists}

  \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{table}


    Options concerning table placement may appear in square bra
    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 fl
    \end{itemize}


\end{document} % required
```

Special document class for creating slide presentations with Powerpoint-like features: beamer.

```
http://latex-beamer.sourceforge.net/
```