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

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}
```

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```
\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
```

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

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

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