

22S:166
Computing in Statistics

Introduction to \LaTeX

Lecture 3
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- `.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

Why 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

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. 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):
`evince <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):
`evince <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 con-

tent of these windows will be updated automatically, or by using File/Reopen or File/Open.

More on processing L^AT_EX documents

- integrated L^AT_EX 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 L^AT_EX commands
 - Kile – for Linux; installed on Linux network
 - * integrates processing of multiple file documents, including BibTeX
 - TeXnicCenter – for Windows; installed on CSG-managed Windows machines
- different steps may be necessary for incorporating different kinds of graphics files into documents

Basic L^AT_EX

- current version of L^AT_EX is L^AT_EX 2_ε.
- previous version was L^AT_EX 2.09.
- lincs that must appear in *every* L^AT_EX 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 op

%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\ featu

\end{abstract}
```

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 back 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{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}
```

```
\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}
```