

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

Introduction to L^AT_EX

Lecture 3
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- .dvi files produced in L^AT_EX 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^AT_EX format

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Why should you learn L^AT_EX ?

- 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

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Processing L^AT_EX 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> &

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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!

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* 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

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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
 - * 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

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More on doing L^AT_EX in Emacs

- in the directory in which you wish to work, start Emacs
- use the File menu to either open an existing L^AT_EX 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)
```

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Basic L^AT_EX

- current version of L^AT_EX is L^AT_EX 2_ε.
- previous version was L^AT_EX 2.09.
- lines 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

%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: $\&$, $\$$, $\%$, \sim , $_$, $\{$, $\}$, $\#$, 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 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
\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{verbatim}
```

and ends with

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

```
\end{center}
  \caption{Environments for Tables}\label{tabl}
\end{table}
```

Options concerning table placement may appear in square brackets in 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
```

```
\subsection{Lists}
```

\LaTeX\ has two list environments:

```
\begin{itemize}
  \item bulleted lists
  \item numbered lists
  \begin{enumerate}
    \item differ from bulleted lists in that
          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 is

```
\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{table}
```

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

<http://latex-beamer.sourceforge.net/>