One Hour Tour To LaTex

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October 1, 2006

[Introduction](#)

[General Operation](#)

[LaTex-Beamer](#)

Useful LaTex Books

- *LaTeX: A Document Preparation System*, by Leslie Lamport and Duane Bibby, ($39.95 from Amazon.com), Addison-Wesley Pub Co, ISBN: 0201529831, 2nd Edition, June 30, 1994.

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- *The Latex Companion*, by Michel Goossens, Frank Mittelbach, and Alexander Samarin, ($39.99 from Amazon.com), Addison-Wesley Pub Co; ISBN: 0201541998; 1st edition, December 31, 1993).

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- *Math into LaTeX*, by George Gratzer, ($34.97 from Amazon.com), Birkhauser, ISBN: 0817641319, 3rd edition (June 23, 2000).

Useful Websites

- www.winedt.com

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- www.winedt.com
- www.miktex.org

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- www.ctan.org

On Merlot

- ▶ ssh to merlot

On Merlot

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- ▶ Prepare a LaTex file using a name such as

    filename.tex

  - ▶ You can use either vi or emacs or others to type your LaTex file.
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- ▶ If there are no errors, LaTex command will automatically produce the following three files:

  filename.aux, filename.log, and filename.dvi.

On Merlot (continued)

▶ You can print filename.dvi on the printer using command:

dvips filename.dvi

On Merlot (continued)

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- ► You can convert your dvi file to a high quality pdf file using command:

  "pdflatex filename.tex" or "dvipdf filename.dvi filename.pdf".

On Merlot (continued)

- ▶ You can print filename.dvi on the printer using command:

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- ▶ You can view your dvi file using MikTex DVI Viewer.

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- ▶ You can convert your dvi file to a high quality ps file using command:

  dvips filename.dvi -o filename.ps.

On PC

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- ▶ Compile your filename.tex using a WinEdt manual bar.
- ▶ View your filename.dvi using a WinEdt manual bar.
- ▶ Convert your filename.dvi to pdf or ps file using WinEdt manual bars.

Document Class

The \documentclass command has the following format:

    \documentclass[12pt]{class}

Standard **class** Options

- article

Standard **class** Options

- article
- book

Standard **class** Options

- article
- book
- report

Standard **class** Options

- article
- book
- report
- letter

Standard **class** Options

- article
- book
- report
- letter
- seminar

Standard **class** Options

- ▶ article
- ▶ book
- ▶ report
- ▶ letter
- ▶ seminar
- ▶ beamer

Documentclass Option

You can choose more than one option.

```
\documentclass[11pt,twocolumn]{article}
```

Common Standard Option in \documentclass[..]

10pt This is the default size. To make ten-point size, you can simply use

    \documentclass{article}

12pt Makes twelve-point type the normal (default) type size instead of ten-point type.

twoside Formats the output for printing on both sides of a page. (This is the default in the book style.)

twocolumn Produces two-column pages.

Common Standard Option in \documentclass[..] (cont.)

titlepage For article style only; causes the \maketitle command and the abstract environment each to make a separate page. This is the default setting for report and book styles.

leqno Puts formula numbers on the left side in equation and eqnarray environments.

fleqn left-aligns displayed formulas.

Standard Article Document Setting

```
\documentclass[12pt]{article}
\usepackage{epsfig,graphics,latexsym,amsfonts,amssymb,
            amsmath,verbatim}
\hoffset=-0.675in
\advance\topmargin by -0.45truein
\oddsidemargin=0.675truein
\evensidemargin=0.675truein
\advance\textheight by 1.25truein
\setlength\textwidth{6.5in}
\vsize=9.0in
\def\doublespace{\baselineskip=20pt minus 1pt}
```

Standard Article Document Setting (cont.)

```
\begin{document}
\title{Introduction to LaTex}
\author{Your Name \\ Affiliation}
\maketitle
\begin{center}
\noindent{\large \bf Abstract}
\end{center}
\section{Introduction}
\section{Basics}
\subsection{Math} ... \subsection{Display}
\section{Summary}
\section*{References}
\section*{Appendix}
\end{document}
```

Standard letter Setting

```
\documentclass[11pt]{letter}
\hoffset=-0.475in
\advance\topmargin by -0.75truein
\oddsidemargin=0.475truein
\evensidemargin=0.475truein
\advance\textheight by 1.25truein
\setlength\textwidth{6.5in}
\vsize=8.9in
```

Standard letter Setting (cont.)

```
\begin{document}
\address{ your name \\
         email address}
\begin{letter}{  Dr. Who \\
                 address line 1 \\ address line 2 \\
                 city, state zip code}
\opening{Dear Who,}
Sincerely Yours,
\vspace*{0.3in}
  Your names \\
  Your complete address
\end{letter}
\end{document}
```

Comments

In the LaTex environment, you can use

```
either

% this is comments

or

\begin{comment}
 this text will be commented out.
\end{comment}
```

Verbatim

Computer codes, or SAS outputs, no matter what special characters they have, may be listed with the verbatim environment:
\begin{verbatim}

...
\end{verbatim}
For example,

```
              Standard               95% Confidence   Chi-
 Parameter   DF Estimate   Error        Limits      Square Pr > ChiSq
 Intercept    1   3.5288   0.9041   1.7567   5.3008  15.23   <.0001
 Z1           1  -0.1477   0.4076  -0.9465   0.6511   0.13   0.7171
 Z2           1  -0.5866   0.3199  -1.2136   0.0405   3.36   0.0668
 Z3           1  -1.5441   0.3633  -2.2561  -0.8321  18.07   <.0001
 Z4           1  -0.0175   0.0128  -0.0425   0.0076   1.87   0.1717
 Scale        1   0.8848   0.1084   0.6960   1.1250
 Weibull Shape 1  1.1301   0.1384   0.8889   1.4368
```

Type Size in LaTex

The following options (from smallest to largest) for type size are available:

```
\tiny, \scriptsize, \footnotesize, \small, \normalsize,
\large, \Large, \LARGE, \huge, \Huge
```

For example, Commands {\tiny Statistics} and {\Huge Statistics} give

_{Statistics} Statistics

Type Style

Common Type Styles include

 \rm \em \it \bf \sc \sl \tt

For example, command \sc{Ming-Hui Chen} gives

Ming-Hui Chen

List-Making Environments

• Itemized Lists
Three ways to do itemized lists:

```
\begin{itemize}
\item Step 1: edit an input file
\item Step 2: compile the input file
\item Step 3: Print the input file
\end{itemize}
```

- Step 1: edit an input file
- Step 2: compile the input file
- Step 3: Print the input file

List-Making Environments (cont.)

```
\begin{itemize}
\item[] Step 1: edit an input file
\item[] Step 2: compile the input file
\item[] Step 3: Print the input file
\end{itemize}
```

Step 1: edit an input file

Step 2: compile the input file

Step 3: Print the input file

List-Making Environments (cont.)

```
\begin{itemize}
\item[Step 1:] edit an input file
\item[Step 2:] compile the input file
\item[Step 3:] Print the input file
\end{itemize}
```

Step 1: edit an input file

Step 2: compile the input file

Step 3: Print the input file

List-Making Environments (cont.)

• Enumerated Lists

```
\begin{enumerate}
\item Step 1: edit an input file
\item Step 2: compile the input file
\item Step 3: Print the input file
\end{enumerate}
```

1. Step 1: edit an input file
2. Step 2: compile the input file
3. Step 3: Print the input file

List-Making Environments (cont.)

• Description Lists

```
\begin{description}
\item[Step 1:] edit an input file
\item[Step 2:] compile the input file
\item[Step 3:] Print the input file
\end{description}
```

Step 1: edit an input file

Step 2: compile the input file

Step 3: Print the input file

Math Environments

- Mathematics to be typeset inline with the text must be contained in the environment

`\begin{math}...\end{math}`

or

`\(...\)`

or

`$...$`

Math Environments (cont.)

♠ **An Example**:
Three commands:

```
 display \begin{math}  \sin(x^2)=10 \end{math} in line
 display \( \sin(x^2)=10 \) in line
 display $ \sin(x^2)=10 $ in line
```

produce
display $\sin(x^2) = 10$ in line
display $\sin(x^2) = 10$ in line
display $\sin(x^2) = 10$ in line

Math Environments (cont.)

♠ **scripts, symbols, common math functions**
Subscripts, superscripts, and math functions are typeset in a mathematics environment.
For example,

```
d^{-1}, d^2, a_i, \sin, \cos, \ln, \log, \exp
```

produce

$$d^{-1}, d^2, a_i, \sin, \cos, \ln, \log, \exp$$

Math Environments (cont.)

LaTeX has an enormously wide variety of symbols to help typeset mathematics. For example,

```
\times,\propto,\sum,\Sigma,\sigma,\pi,\rightarrow,\Rightar
\prod, \coprod, \Longleftarrow, \thicksim, \sim, \subset,
\in, \forall, \cup, \cap, \alpha,\theta, \beta,\int
```

$$\times, \propto, \sum, \Sigma, \sigma, \pi, \rightarrow, \Rightarrow,$$

$$\prod, \coprod, \Longleftarrow, \sim, \sim, \subset,$$

$$\in, \forall, \cup, \cap, \alpha, \theta, \beta, \int$$

Math Environments (cont.)

♠ displaymath and frac

Many mathematical equations and expressions are so complicated
or so important that they should not be typeset inline with the
text, but they should be displayed on a line all by themselves. This
is achieved with the environments:

```
\begin{displaymath}
...
\end{displaymath}
equivalent to the shorter
\[
...
\]
or
\begin{equation}
...        \label{eqn1}
\end{equation}
```

Math Environments (cont.)

♠ Example

```
\begin{displaymath}
 I=\int^\infty_{-\infty} \frac{x^2}{1+\exp(x^2)} dx.
\end{displaymath}
\[
 I=\int^\infty_{-\infty} \frac{x^2}{1+\exp(x^2)} dx.
\]
\begin{equation}
I=\int^\infty_{-\infty} \frac{x^2}{1+\exp(x^2)} dx.
\end{equation}
```

Math Environments (cont.)

♠ **Example** (cont.)
These will produce

$$I = \int_{-\infty}^{\infty} \frac{x^2}{1 + \exp(x^2)} dx.$$

$$I = \int_{-\infty}^{\infty} \frac{x^2}{1 + \exp(x^2)} dx.$$

$$I = \int_{-\infty}^{\infty} \frac{x^2}{1 + \exp(x^2)} dx. \tag{1}$$

Math Environments (cont.)

♠ Equation arrays

Often we want to align related equations together, or to align each line of a multi-line derivation. The eqnarray mathematics environment does this.

```
\begin{eqnarray*}
 f(x) & = & \exp(-x),  x>0 \\
 g(x) & = & x^2,   -1<x<1 \\
 h(x) & = & x^3,  x<0
\end{eqnarray*}
or
\begin{eqnarray}
 f(x) & = & \exp(-x),  x>0 \nonumber \\
 g(x) & = & x^2,   -1<x<1  \\
 h(x) & = & x^3,  x<0
\end{eqnarray}
```

Math Environments (cont.)

♠ **Equation arrays (cont.)**
These will produce

$$
\begin{array}{rcl}
f(x) & = & \exp(-x), x > 0 \\
g(x) & = & x^2, -1 < x < 1 \\
h(x) & = & x^3, x < 0
\end{array}
$$

$$
\begin{array}{rcl}
f(x) & = & \exp(-x), x > 0 \\
g(x) & = & x^2, -1 < x < 1 \quad\quad (2) \\
h(x) & = & x^3, x < 0 \quad\quad (3)
\end{array}
$$

Math Environments (cont.)

We can also do

```
\begin{align*}
 f(x) = & \exp(-x), x>0 \\
 g(x) = & x^2, -1<x<1 \\
 h(x) = & x^3, x<0
\end{align*}
or
\begin{align}
 f(x) = & \exp(-x), x>0 \nonumber \\
 g(x) = & x^2, -1<x<1 \\
 h(x) = & x^3, x<0
\end{align}
```

Math Environments (cont.)

$$
\begin{aligned}
f(x) &= \exp(-x), x > 0 \\
g(x) &= x^2, -1 < x < 1 \\
h(x) &= x^3, x < 0
\end{aligned}
$$

or

$$
\begin{aligned}
f(x) &= \exp(-x), x > 0 \\
g(x) &= x^2, -1 < x < 1 \tag{4} \\
h(x) &= x^3, x < 0 \tag{5}
\end{aligned}
$$

Math Environments (cont.)

♠ **Matrices and Other Useful Displays**

```
$$
X \sim N\left( \left( \begin{array}{c}
        \mu_1   \\
        \mu_2
    \end{array} \right),
    \begin{pmatrix}
   \sigma^2_1 & \sigma_1 \sigma_2 \rho \\
   \sigma_1 \sigma_2 \rho & \sigma^2_2
   \end{pmatrix}
   \right)
$$
```

Math Environments (cont.)

♠ **Matrices and Other Useful Displays (cont.)**
This gives

$$X \sim N\left(\left(\begin{array}{c} \mu_1 \\ \mu_2 \end{array} \right), \begin{pmatrix} \sigma_1^2 & \sigma_1\sigma_2\rho \\ \sigma_1\sigma_2\rho & \sigma_2^2 \end{pmatrix} \right)$$

Math Environments (cont.)

```
$$
\overline{Y}=\frac{1}{n}\sum^n_{i=1}Y_i
$$
$$
 \sqrt{n} \Bigg( \frac{\overline{Y}-\mu}{\sigma}
  \Bigg)
 \stackrel{D}{\longrightarrow}
 N\Big(0, 1 \Big)
$$
```

Math Environments (cont.)

This displays the formulas:

$$\overline{Y} = \frac{1}{n} \sum_{i=1}^{n} Y_i$$

$$\sqrt{n}\left(\frac{\overline{Y} - \mu}{\sigma}\right) \xrightarrow{D} N\left(0, 1\right)$$

Math Environments (cont.)

```
\begin{equation}
f(x) = \begin{cases}
        \lambda \exp(-\lambda x) & \mbox{if $x>0$}, \\
        0 & \mbox{otherwise}.
        \end{cases}
 \lable{eqnf}
\end{equation}
```

$$f(x) = \begin{cases} \lambda \exp(-\lambda x) & \text{if } x > 0, \\ 0 & \text{otherwise}. \end{cases} \quad (6)$$

Tables

```
\begin{center}
{\bf Table 1: Parameter Estimates} \\
\medskip

\begin{tabular}{|l|crrrrrc|}\hline
    &  &  & Standard & \multicolumn{2}{c}{95\% Confidence} & Chi- & \\
 Parameter & DF & Estimate  & Error  & \multicolumn{2}{c}{Limits}
           & Square & Pr $>$ ChiSq \\
 \hline
 Intercept &    1 & 3.5288 & 0.9041 & 1.7567 & 5.3008 & 15.23 &  $<$.0001 \\
 Z1        &    1 &-0.1477 & 0.4076 &-0.9465 & 0.6511 &  0.13 &   0.7171 \\
 Z2        &    1 &-0.5866 & 0.3199 &-1.2136 & 0.0405 &  3.36 &   0.0668 \\
 Z3        &    1 &-1.5441 & 0.3633 &-2.2561 &-0.8321 & 18.07 &  $<$.0001 \\
 Z4        &    1 &-0.0175 & 0.0128 &-0.0425 & 0.0076 &  1.87 &   0.1717 \\
 Scale     &    1 & 0.8848 & 0.1084 & 0.6960 & 1.1250 &       &          \\
 Weibull Shape &1 & 1.1301 & 0.1384 & 0.8889 & 1.4368 &       &    \\ \hline
\end{tabular}
\end{center}
```

Tables (cont.)

Table 1: Parameter Estimates

Parameter	DF	Estimate	Standard Error	95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	3.5288	0.9041	1.7567	5.3008	15.23	<.0001
Z1	1	-0.1477	0.4076	-0.9465	0.6511	0.13	0.7171
Z2	1	-0.5866	0.3199	-1.2136	0.0405	3.36	0.0668
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Z4	1	-0.0175	0.0128	-0.0425	0.0076	1.87	0.1717
Scale	1	0.8848	0.1084	0.6960	1.1250		
Weibull Shape	1	1.1301	0.1384	0.8889	1.4368		

Figures

- **Format I**

```
\begin{figure}[htbp]
  \begin{center}
  \includegraphics[height=2in,width=4in,angle=270]{KM.ps}
  \caption{Kaplan-Meier plot for E1684 data}
  \label{fig:label}
  \end{center}
\end{figure}
```

This command does not work (properly) in

```
\documentclass[]{seminar}
```

Figures

• **Format II**

The following commands work almost in all environments:

```
\begin{figure}[hbpt]
\centerline{\psfig{figure=KM.ps,height=2.0 in,width=4.0 in}}
\centering{Fig. 1: Kaplan-Meier plot for E1684 data}
\end{figure}
or
\begin{figure}[hbpt]
\centerline{\psfig{figure=KM.ps,height=2.0 in,width=4.0 in}}
 \caption{Kaplan-Meier plot for E1684 data}
 \label{fig:KM}
\end{figure}
```
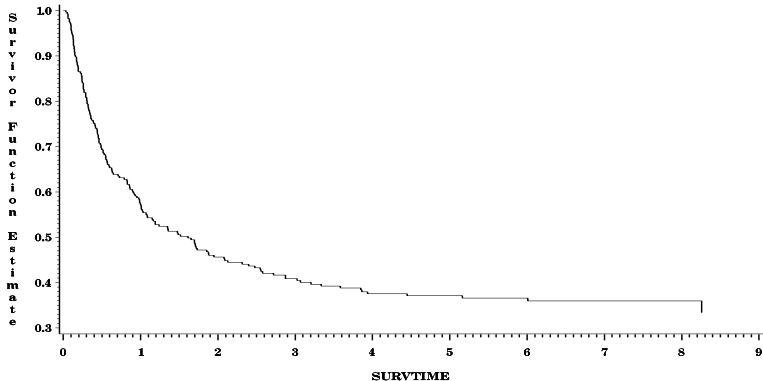
Figures (cont.)

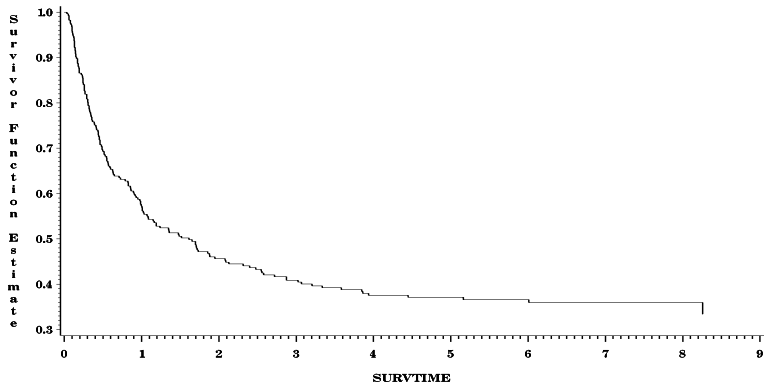Fig. 1: Kaplan-Meier plot for E1684 data

Figures (cont.)

Figure: Kaplan-Meier plot for E1684 data

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- ▶ The Beamer package has been installed on all PC's in the labs.

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- You then convert it to pdf by using "dvipdf filename.dvi filename.pdf" on merlot.
- If you use WinEdt, convert your filename.dvi to pdf or ps file using WinEdt manual bars.

Install Beamer into MiKTeX

- ▶ **Run MiKTeX Package Manager:** Open the MiKTeX Package Manager. This should be under the Start Menu, under Programs (or All Programs) and under the MiKTeX folder for your version. It could also be called the "Browser Packages", depending upon your installed version.

Install Beamer into MiKTeX

- **Run MiKTeX Package Manager:** Open the MiKTeX Package Manager. This should be under the Start Menu, under Programs (or All Programs) and under the MiKTeX folder for your version. It could also be called the "Browser Packages", depending upon your installed version.
- **Install Beamer Package:** It should pause and update the list with all of the packages that are installed or available to be installed. Look in the list for "Beamer" and select it. Then either right click and select the option to install or use the plus icon on the titlebar to install. (If it does not update the list or if it does not install when you ask it to then select another mirror by using the "Repository - Change Package Repository" dropdown menu option. The tug.ctan.org USA mirror seems to work quite well.)

Install Beamer into MiKTeX (cont.)

- ▶ **Install PGF Package:** In the list locate the package for "pgf" and install it similarly to installing the "Beamer" package. This is a dependency in the documentation needed for Beamer.

Install Beamer into MiKTeX (cont.)

- ▶ **Install PGF Package:** In the list locate the package for "pgf" and install it similarly to installing the "Beamer" package. This is a dependency in the documentation needed for Beamer.

- ▶ **Install XColor Package:** In the list locate the package "xcolor" and install it in a similar way as you install the "Beamer" package. This may not be needed if it is already installed in your MiKTeX.

LaTex Tutorial Website

www.stat.uconn.edu/∼mhchen/LaTex