Introduction to LaTeX

The files used in this section are first.tex, first.pdf, RJournal.zip, Biometrics.zip, and nuthesis.zip.

Word

Word is a word processor. It is based on the "what you see is what you get" (WYSIWYG) philosophy of typing documents. The software allows one to see immediately what the document is going to look like printed after it is typed.

I really like Word. Through typing a 300+ page dissertation in Word, lecture notes for most courses, and many published journal articles, I have learned how to use Word very well. However, there are issues with the software:

- Current Word equation editor: It simply is not good enough for complex equations. MathType serves as very nice replacement, but there are some issues with its use (to be discussed shortly).
- Floating tables and figures: While you can do these (anchor a table or figure to a page), I often have problems getting text to flow around it.
- Euclid font: MathType's Euclid font allows for a Word document to look similar to that of the default Computer Modern font of LaTeX. However, Greek letters and symbols often look a little different in and outside of equations.
- In-line equations: You need to manually break equations at the end of a line. This is especially needed with full justification of text.
- Equation sizing: MathType equations are embedded images. The sizes of these images change over many saves of a Word document (since Word 2007).

- 64-bit capability:There has been issues with 64-bit Word compatibility of MathType (I have not checked this with the newest version of MathType).
- PowerPoint: If you use MathType, inline equations are not possible. Instead, you need to create separate images that need to be lined up within the normal text.

TeX

TeX is a programming language used for typesetting. The language was developed in the 1970s to help improve the typographical quality of documents. I do not think anyone uses TeX directly anymore. Instead, people use ...

LaTeX

LaTeX is TeX with additional add-ons to make typesetting much easier to use than TeX alone.

Why use LaTeX?

- It's free!
- The majority of statistical (and math, computer science, many other science disciplines) researchers use it.
- Much of the decision process for how your paper will look (e.g., fonts, section titles, bibliography style) is no longer the author's responsibility. There are set styles available to control all formatting. This is kind of like "Styles" available in Word, but to a much larger degree.
- Simply, documents will look nicer with LaTeX than Word. HOWEVER, one can often develop close approximations within Word by using the Euclid font and MathType.

- Some journals require (or strongly encourage) the use of LaTeX. Journals will provide a particular type of "style" file that can be used to ensure the paper is within the journal's own style. This allows these journals to more quickly get an accepted paper into the official journal version.
- Book publishers often encourage authors to type their book in LaTeX for similar reasons as journals.
- Before a journal or book is published, proofs of the final form will be sent to an author. If the submitted version was in LaTeX, there will be a much smaller number of errors to correct by the author than if Word was used (non-LaTeX documents often need to be re-typed by the publisher).

LaTeX is not a word processor. Rather, it allows one to type a document using a programming language sort of like HTML. A LaTeX document then needs to be compiled so that a PDF (or other file type) can be created.

Still, I do not like LaTeX. So, why are we discussing it here? In order to use LyX! LyX uses LaTeX to create its documents through a nice Word-like GUI. Still, it will be helpful to know about LaTeX when using LyX, especially when one needs to include a little LaTeX code in a LyX document. Plus, it can be difficult sometimes to get a journal's LaTeX template (.sty or .cls files) to work completely with LyX. This leads one to use LyX for most of the composing of a paper and then export it as a LaTeX document toward the end of writing.

MikTeX

Most people do not use LaTeX directly. Instead, they use other implementations of LaTeX and TeX. The most popular one for Windows is MiKTeX, and this is what my collaborators and I use. While people may use MiKTeX, most people will still say they use LaTeX. Note that MikTeX is free.

MikTeX's website is at `http://miktex.org`. Select the Download link to download it to your computer. Note that installation can take some time. Alternatively, you can have MikTeX installed during a LyX installation (select the bundle executable at `http://www.lyx.org/Download`)

CTAN

Similar to R, there are many user created packages that users can download and install. The Comprehensive TeX Archive Network (CTAN) is LaTeX's version of CRAN. Its website is `http://www.ctan.org`. Note that UNL has a mirror at `http://mirror.unl.edu/ctan`.

Program editors

The typical process for using LaTeX is to type LaTeX code into a program editor. This code needs to be manually compiled in order to create a PDF of what a document will look like (i.e., like what you would see in Word). Editors will have a button for you to click on to complete the compilation.

Below are descriptions of a few program editors. There are many other editors available!

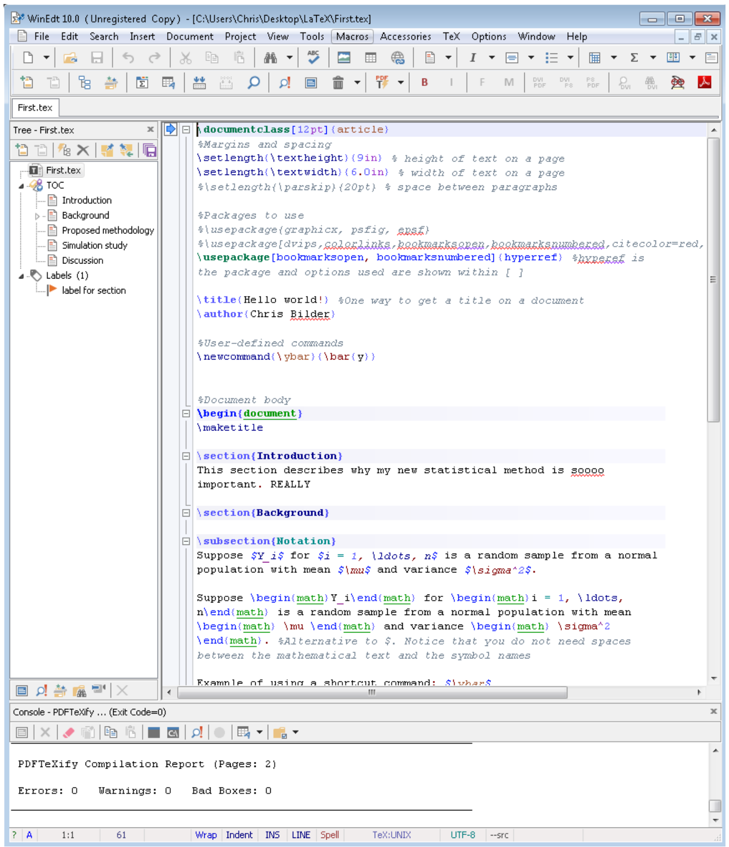
TeXworks

This editor comes with MikTeX. The website for it is `http://www.tug.org/texworks`. The editor is functional, but I think there are better editors available.

WinEdt

I have used this editor since 2004. The editor is shareware. After a 31 day free trial, you can purchase it or deal with annoying messages about purchasing it. WinEdt can be downloaded from `http://www.winedt.com`.

Below is a screen capture from WinEdt 10 with the First.tex file (example to be discussed shortly) displayed within it. This editor has the nicest syntax highlighting of all editors that I have seen, and it allows for code folding (see the plus signs in the margin next to the code).


WinEdt 10.0 (Unregistered Copy) - [C:\Users\Chris\Desktop\LaTeX\First.tex]
File Edit Search Insert Document Project View Tools Macros Accessories TeX Options Window Help
First.tex
Tree - First.tex
First.tex
TOC
Introduction
Background
Proposed methodology
Simulation study
Discussion
Labels (1)
label for section
Console - PDFTeXify ... (Exit Code=0)
? A 1:1 61 Wrap Indent INS LINE Spell TeX:UNIX UTF-8 --src

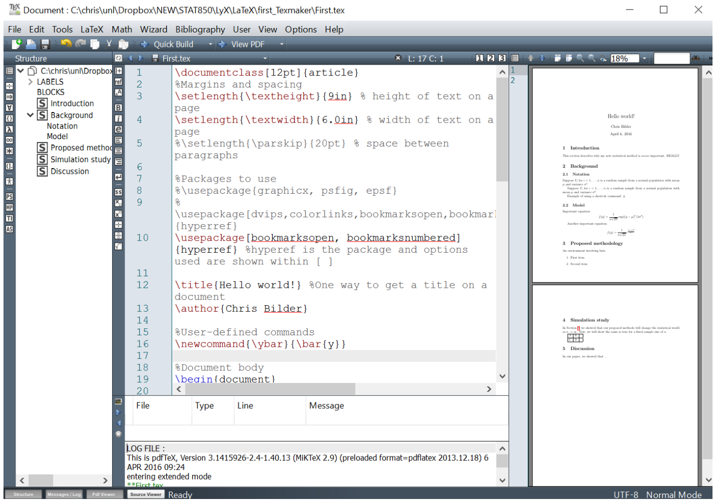
```
\documentclass[12pt]{article}
%Margins and spacing
\setlength{\textheight}{9in} % height of text on a page
\setlength{\textwidth}{6.0in} % width of text on a page
%\setlength{\parskip}{20pt} % space between paragraphs

%Packages to use
%\usepackage{graphicx, psfig, epsf}
%\usepackage[dvips,colorlinks,bookmarksopen,bookmarksnumbered,citecolor=red,
\usepackage[bookmarksopen, bookmarksnumbered]{hyperref} %hyperef is
the package and options used are shown within [ ]

\title{Hello world!} %One way to get a title on a document
\author{Chris Bilder}

%User-defined commands
\newcommand{\ybar}{\bar{y}}


%Document body
\begin{document}
\maketitle

\section{Introduction}
This section describes why my new statistical method is soooo
important. REALLY

\section{Background}

\subsection{Notation}
Suppose $Y_i$ for $i = 1, \ldots, n$ is a random sample from a normal
population with mean $\mu$ and variance $\sigma^2$.

Suppose \begin{math}Y_i\end{math} for \begin{math}i = 1, \ldots,
n\end{math} is a random sample from a normal population with mean
\begin{math} \mu \end{math} and variance \begin{math} \sigma^2
\end{math}. %Alternative to $. Notice that you do not need spaces
between the mathematical text and the symbol names

Example of using a shortcut command: $\ybar$
```

```
PDFTeXify Compilation Report (Pages: 2)

Errors: 0   Warnings: 0   Bad Boxes: 0
```

Texmaker

This editor is free, and it can be downloaded from `http://www.xm1math.net/texmaker`. I have used it since 2012 as a nice, free alternative to Winedt. Below is a screen capture from version 4.5 with First.tex displayed within it. Code folding can be done within the editor although it is not as conveniently available as in WinEdt.[1] Linked side-by-side views of the .tex and PDF documents are available, although there is no instantaneous updating for the PDF when code changes. The PDF can be popped out of the right side by clicking on the red button in the upper right side for the viewer. If you do not want to see the PDF viewer, select VIEW > Pdf VIEWER or turn it off by selecting Pdf VIEWER IN The left bottom corner. I usually leave the PDF viewer off.

[1] The cursor must be positioned in the first line of a block of text that can be folded (e.g., a `\section{}`). This will bring up an orange minus sign (-) and a vertical line next to the line numbers. Click on the minus to fold the text.

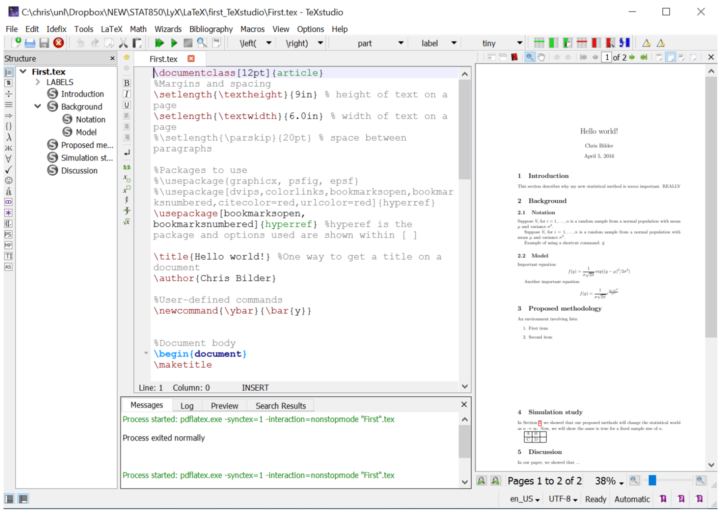


```
\documentclass[12pt]{article}
%Margins and spacing
\setlength{\textheight}{9in} % height of text on a
page
\setlength{\textwidth}{6.0in} % width of text on a
page
%\setlength{\parskip}{20pt} % space between
paragraphs

%Packages to use
%\usepackage{graphicx, psfig, epsf}
%
\usepackage[dvips,colorlinks,bookmarksopen,bookmar
{hyperref}
\usepackage[bookmarksopen, bookmarksnumbered]
{hyperref} %hyperef is the package and options
used are shown within [ ]

\title{Hello world!} %One way to get a title on a
document
\author{Chris Bilder}

%User-defined commands
\newcommand{\ybar}{\bar{y}}

%Document body
\begin{document}
```

```
LOG FILE :
This is pdfTeX, Version 3.1415926-2.4-1.40.13 (MiKTeX 2.9) (preloaded format=pdflatex 2013.12.18) 6
APR 2016 09:24
entering extended mode
**First.tex
```

TEXstudio

This editor is free, and it can be downloaded from `http://texstudio.sourceforge.net`. I have used it a little since 2014. This editor's syntax highlighting is more customizable than in Texmaker's editor, making TEXstudio perhaps a stronger competitor to WinEdt. For example, one can change the background color of particular types of code with OPTIONS > CONFIGURE TEXSTUDIO > SYNTAX HIGHLIGHTING. Below is a screen capture from version 2.10.8 with First.tex displayed within it.



C:\chris\unl\Dropbox\NEW\STAT850\LyX\LaTeX\first_TeXstudio\First.tex - TeXstudio

```
\documentclass[12pt]{article}
%Margins and spacing
\setlength{\textheight}{9in} % height of text on a page
\setlength{\textwidth}{6.0in} % width of text on a page
%\setlength{\parskip}{20pt} % space between paragraphs

%Packages to use
%\usepackage{graphicx, psfig, epsf}
%\usepackage[dvips,colorlinks,bookmarksopen,bookmarksnumbered,citecolor=red,urlcolor=red]{hyperref}
\usepackage[bookmarksopen, bookmarksnumbered]{hyperref} %hypereef is the package and options used are shown within [ ]

\title{Hello world!} %One way to get a title on a document
\author{Chris Bilder}

%User-defined commands
\newcommand{\ybar}{\bar{y}}


%Document body
\begin{document}
\maketitle
```

Line: 1 Column: 0 INSERT

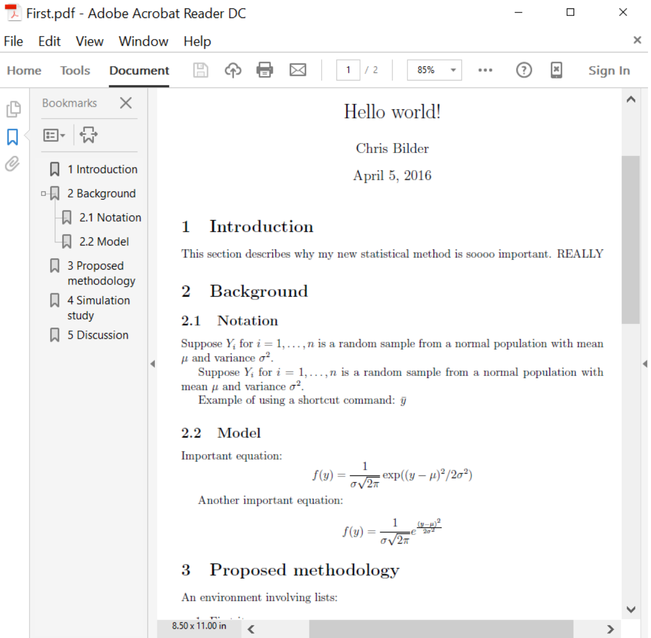
```
Process started: pdflatex.exe -synctex=1 -interaction=nonstopmode "First".tex

Process exited normally


Process started: pdflatex.exe -synctex=1 -interaction=nonstopmode "First".tex
```

Other editors

- Gummi (free): The editor is similar to the previous editors, but it provides an instant preview of what the PDF will look like. It is still being developed, but perhaps without as much activity as needed. See `https://github.com/alexandervdm/gummi`.
- ShareLATEX (not free): An online LATEX editor; `https://www.sharelatex.com`
- Winshell (free): This is a free editor similar to Texmaker; `http://www.winshell.org`

Hello World!

Examine the First.pdf document to see what first.tex will create after being compiled:



First.pdf - Adobe Acrobat Reader DC

Hello world!

Chris Bilder

April 5, 2016

1 Introduction

This section describes why my new statistical method is soooo important. REALLY

2 Background

2.1 Notation

Suppose Y_i for $i = 1, \ldots, n$ is a random sample from a normal population with mean μ and variance σ^2.

Suppose Y_i for $i = 1, \ldots, n$ is a random sample from a normal population with mean μ and variance σ^2.

Example of using a shortcut command: $\bar{y}$

2.2 Model

Important equation:

$$f(y) = \frac{1}{\sigma\sqrt{2\pi}}\exp((y-\mu)^2/2\sigma^2)$$

Another important equation:

$$f(y) = \frac{1}{\sigma\sqrt{2\pi}}e^{\frac{(y-\mu)^2}{2\sigma^2}}$$

3 Proposed methodology

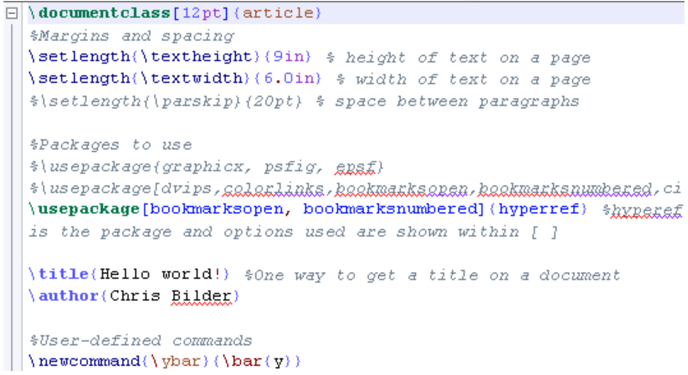
An environment involving lists:

LATEX files (.tex extension) begin with a *preamble* that describes what the document will look like. The preamble contains:

- Document class – article, book, letter, . . . , and various options like the font type and size
- Packages – Particular packages from which to obtain specialized commands

- Margins, spacing, and other items

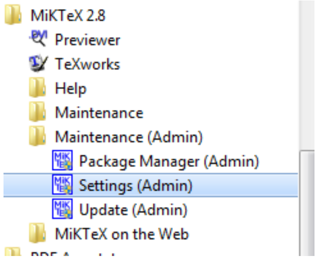
Below is the preamble for the example LATEX document:



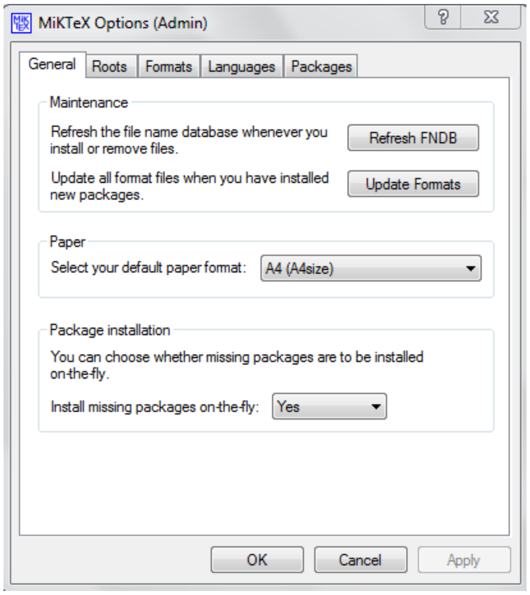
```
\documentclass[12pt]{article}
%Margins and spacing
\setlength{\textheight}{9in} % height of text on a page
\setlength{\textwidth}{6.0in} % width of text on a page
%\setlength{\parskip}{20pt} % space between paragraphs

%Packages to use
%\usepackage{graphicx, psfig, epsf}
%\usepackage[dvips,colorlinks,bookmarksopen,bookmarksnumbered,ci
\usepackage[bookmarksopen, bookmarksnumbered]{hyperref} %hypereef
is the package and options used are shown within [ ]

\title{Hello world!} %One way to get a title on a document
\author{Chris Bilder}

%User-defined commands
\newcommand{\ybar}{\bar{y}}
```

Comments:

- LATEX is case sensitive.
- The document class chosen here is article, which would be appropriate for a number of situations including a paper submitted to a journal.
- The percent symbol `%` is used to begin comments.
- The `hyperref` package allows one to create clickable cross-references within a document. The bookmark options create bookmarks for the PDF document based on section titles.
- Note that MikTEX comes with a number of packages. Packages that are not on a computer already will be downloaded provided the correct package installation settings are selected. You can check these by opening the "Settings (Admin)" application for MikTEX:



Select YES for INSTALL MISSING PACKAGES ON-THE-FLY in the GENERAL tab.



MiKTeX Options (Admin)

Maintenance

Refresh the file name database whenever you install or remove files.

Update all format files when you have installed new packages.

Paper

Select your default paper format: A4 (A4size)

Package installation

You can choose whether missing packages are to be installed on-the-fly.

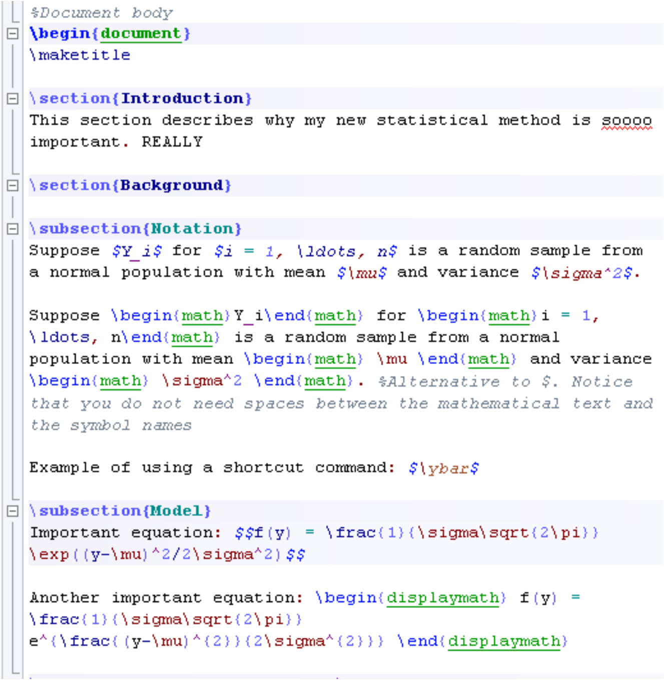
Install missing packages on-the-fly: Yes

- An example user defined function is given at the end of the preamble. How this is used will be discussed later.

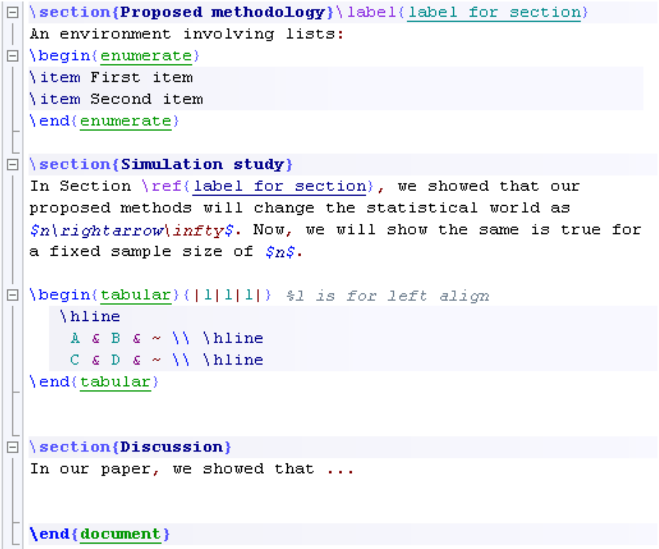
The remainder of a document is the document's body. It is simply enclosed within

```
\begin{document}
\end{document}
```

Below is the document's body (shown in WinEdt):



```
%Document body
\begin{document}
\maketitle

\section{Introduction}
This section describes why my new statistical method is soooo
important. REALLY

\section{Background}

\subsection{Notation}
Suppose $Y_i$ for $i = 1, \ldots, n$ is a random sample from
a normal population with mean $\mu$ and variance $\sigma^2$.

Suppose \begin{math}Y_i\end{math} for \begin{math}i = 1,
\ldots, n\end{math} is a random sample from a normal
population with mean \begin{math} \mu \end{math} and variance
\begin{math} \sigma^2 \end{math}. %Alternative to $. Notice
that you do not need spaces between the mathematical text and
the symbol names

Example of using a shortcut command: $\ybar$

\subsection{Model}
Important equation: $$f(y) = \frac{1}{\sigma\sqrt{2\pi}}
\exp((y-\mu)^2/2\sigma^2)$$

Another important equation: \begin{displaymath} f(y) =
\frac{1}{\sigma\sqrt{2\pi}}
e^{\frac{(y-\mu)^{2}}{2\sigma^{2}}} \end{displaymath}
```



```
\section{Proposed methodology}\label{label for section}
An environment involving lists:
\begin{enumerate}
\item First item
\item Second item
\end{enumerate}

\section{Simulation study}
In Section \ref{label for section}, we showed that our
proposed methods will change the statistical world as
$n\rightarrow\infty$. Now, we will show the same is true for
a fixed sample size of $n$.

\begin{tabular}{|l|l|l|} %l is for left align
   \hline
    A & B & ~ \\ \hline
    C & D & ~ \\ \hline
\end{tabular}


\section{Discussion}
In our paper, we showed that ...


\end{document}
```

Comments:

- `\section{}` and `\subsection{}` create the sections for the document. These specific commands are available because article was chosen as the document class.
- Potential misspellings are highlighted in the text by the editor. There is no grammar check.
- Mathematical symbols and equations are enclosed within dollar signs. A single dollar sign $ is used for an inline symbol/equation and double dollar signs $$ are used for a *displayed* symbol/equation that is on a line of its own. It can take some time to know the correct words for symbols! Below are some basics:

  - Spell out Greek letter names
  - Underscore _ creates subscripts
  - Carat ^ creates superscripts

  There are a number of sources available on the Internet where symbols are listed–see the link to Marie Davidian's notes later.

- The dollar signs are a shortcut way to begin a math *environment* within LaTeX. Environments allow one to let LaTeX know that a specific type of text is used. The general syntax for inline mathematical symbol/equation is

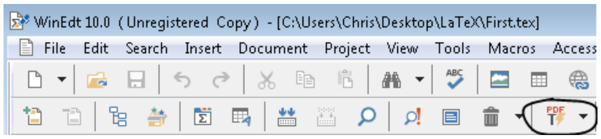
  ```
  \begin{math}
  <Insert equation code here>
  \end{math}
  ```

  An additional environment example is given for a list using the enumerate environment. Note that `\section{}` and `\subsection{}` are actually starting environments too, but shorthand syntax can again be used with them too by leaving off the `\begin{}` and `\end{}`.

- A cross-reference is created using `\label{}`, and it is referenced with `\ref{}`.
- Tables are not very user friendly to create within LaTeX. The example in the document shows the code for a very simple 2 × 3 table where the third column purposely has no content.
- `\ybar` is an example of a user-defined shortcut expression to specify a longer set of code.
- Extra spaces between words are ignored!!!
- Blank lines between text are ignored!!!

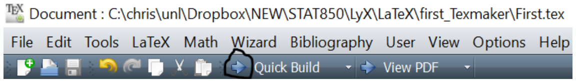
In order to create the PDF shown at the beginning of this example, the LaTeX code needs to be compiled. This is done by clicking on the correct icon in an editor:

- WinEdt


WinEdt 10.0 (Unregistered Copy) - [C:\Users\Chris\Desktop\LaTeX\First.tex]
File Edit Search Insert Document Project View Tools Macros Access
PDF

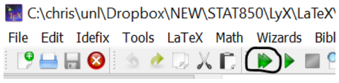
  Make sure PDFLaTeX is selected in the dropdown menu and select the PDF L icon.

- Texmaker


Document : C:\chris\unl\Dropbox\NEW\STAT850\LyX\LaTeX\first_Texmaker\First.tex
File Edit Tools LaTeX Math Wizard Bibliography User View Options Help
Quick Build
View PDF

  Make sure PDFLaTeX is selected in the dropdown menu and select the arrow to the left of it. The default of QUICK BUILD uses PDFLaTeX too and also puts the PDF in the right side viewer (see OPTIONS > CONFIGURE TEXMAKER > QUICK BUILD).

- TeXStudio


C:\chris\unl\Dropbox\NEW\STAT850\LyX\LaTeX\
File Edit Idefix Tools LaTeX Math Wizards Bibl

Before compiling, you will need to close any previous PDF file for the document (outside of PDF viewers) before a new PDF can be created.

Other files will be created in addition to the PDF (most are plain text documents). These files include:

- .log – This is a typical log file created by a compiler. Error and warning messages will be put there.
- .aux – An auxiliary file that stores information needed from one compilation run to the next.

- .out – Additional information saved from one compilation run to the next.

More complicated LaTeX documents will lead to additional files. See page 14 of Oetiker et al. (2011) for descriptions. These files generally should not be deleted, but they do not need to be shared with others.

What happens if a different document class is used? It depends on the class. Code like `\section` and `\subsection` are associated with the article document class. They may not be used with other classes. With the current example, you can try the book document class to see one that works. With this document class, one can now use `\chapter` (no chapter is defined in my document so section numbers will start with a "0" in the PDF).

Resources for LaTeX

- Marie Davidian's lecture notes for NC State's STAT 810A's "Preparation for Statistical Research Course" at `http://www4.stat.ncsu.edu/~davidian/st810a/index.html`. See the introduction to LaTeX on 1/25/05 and 2/1/05.
- Oetiker, T., Partl, H., Hyna, I. and Schlegl, E. (2011). The Not So Short Introduction to LaTeX 2e. Available at `http://www.ctan.org/tex-archive/info/lshort/english`.
- Comparison of LaTeX editors: `http://en.wikipedia.org/wiki/Comparison_of_TeX_editors`
- StackExchange for LaTeX: `http://tex.stackexchange.com`
- LaTeX basics at wikibooks: `http://en.wikibooks.org/wiki/LaTeX/Basics`
- Rob Hyndman's workshop: `http://robjhyndman.com/hyndsight/latex-workshop`

- The `tikZ` package allows one to draw figures with LaTex code. See `http://www.texample.net/tikz/examples`.
- MathType can create LaTeX code. For example, open the MathType editor and simply select the Greek letter α in the appropriate drop down menu. Select PREFERENCES > TRANSLATORS > TRANSLATION TO OTHER LANGUAGES (TEXT). Make sure the LaTeX translator is chosen. Also, uncheck the INCLUDE MATHTYPE DATA IN TRANSLATION box. If you copy the letter in MathType and paste into Word, you obtain:

  ```
  $\alpha$
  ```

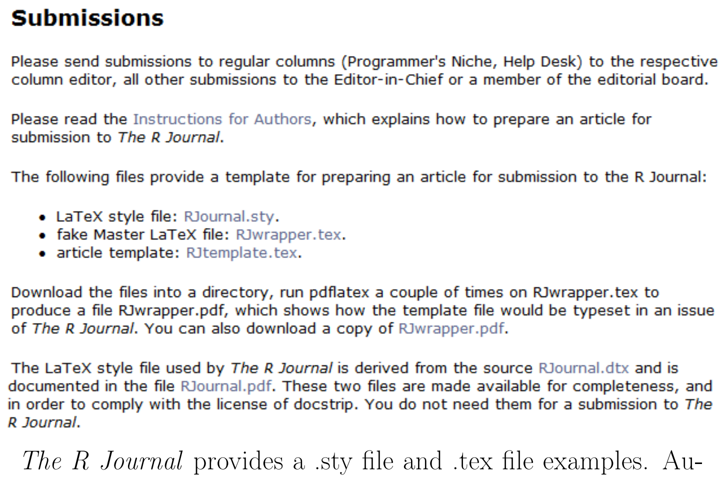
  You can even write LaTeX equation code in MathType (and Word's equation editor) to produce mathematical expressions. Select PREFERENCES > WORKSPACE PREFERENCES and check the ALLOW TEX LANGUAGE ENTRY FROM THE KEYBOARD. In the editor, you can type `\alpha` and <ENTER> to obtain α. Note that the first time you try this, MathType may produce a warning message which then can cause problems during your first attempt.

Journal specific LaTeX files

Most statistical research journals provide their own set of LaTeX instructions for submissions. These instructions may include example LaTeX files, style files (.sty), document class files (.cls), and bibliography style files (.bst). The style and class files are used via the `\usepackage` and the `\documentclass` commands, respectively, and these commands are put in the preamble of a LaTeX file. It is easiest to put any of these files in the same folder as your main .tex document so that LaTeX can find them. We will discuss .bst files when using LyX. Next are two examples of how I have used LaTeX when writing papers for journals.

R Journal paper

This paper is the final version of Bilder et al. (2010, p. 56-60) that was sent to *The R Journal*. Author instructions for *The R Journal* are at `http://journal.r-project.org/submissions.html`. Below is a screen capture from their web page:



Submissions

Please send submissions to regular columns (Programmer's Niche, Help Desk) to the respective column editor, all other submissions to the Editor-in-Chief or a member of the editorial board.

Please read the Instructions for Authors, which explains how to prepare an article for submission to *The R Journal*.

The following files provide a template for preparing an article for submission to the R Journal:

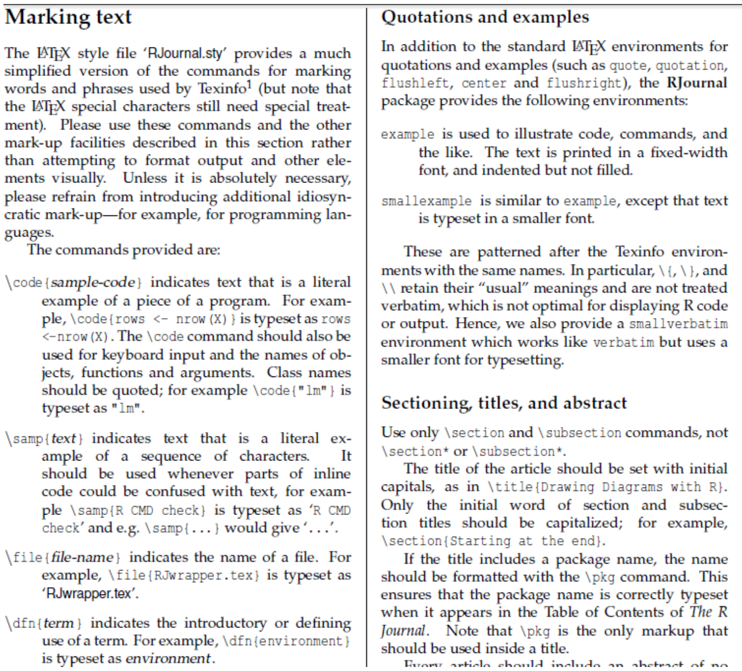
- LaTeX style file: RJournal.sty.
- fake Master LaTeX file: RJwrapper.tex.
- article template: RJtemplate.tex.

Download the files into a directory, run pdflatex a couple of times on RJwrapper.tex to produce a file RJwrapper.pdf, which shows how the template file would be typeset in an issue of *The R Journal*. You can also download a copy of RJwrapper.pdf.

The LaTeX style file used by *The R Journal* is derived from the source RJournal.dtx and is documented in the file RJournal.pdf. These two files are made available for completeness, and in order to comply with the license of docstrip. You do not need them for a submission to *The R Journal*.

The R Journal provides a .sty file and .tex file examples. Authors are expected to complete their own .tex file for the main content of the paper and call this file within the RJwrapper.tex file (similar to using `%include` in SAS or `source()` in R). The RJwrapper.tex file is to be compiled. Note that *The R Journal* changed its .sty file in 2013. I decided to use the original file because this was used for publication.

Page 2 of the "Instructions for Authors" file provides information on what the style file allows:



Marking text

The LaTeX style file 'RJournal.sty' provides a much simplified version of the commands for marking words and phrases used by Texinfo[1] (but note that the LaTeX special characters still need special treatment). Please use these commands and the other mark-up facilities described in this section rather than attempting to format output and other elements visually. Unless it is absolutely necessary, please refrain from introducing additional idiosyncratic mark-up—for example, for programming languages.

The commands provided are:

`\code{`*sample-code*`}` indicates text that is a literal example of a piece of a program. For example, `\code{rows <- nrow(X)}` is typeset as `rows <-nrow(X)`. The `\code` command should also be used for keyboard input and the names of objects, functions and arguments. Class names should be quoted; for example `\code{"lm"}` is typeset as `"lm"`.

`\samp{`*text*`}` indicates text that is a literal example of a sequence of characters. It should be used whenever parts of inline code could be confused with text, for example `\samp{R CMD check}` is typeset as '`R CMD check`' and e.g. `\samp{...}` would give '`...`'.

`\file{`*file-name*`}` indicates the name of a file. For example, `\file{RJwrapper.tex}` is typeset as 'RJwrapper.tex'.

`\dfn{`*term*`}` indicates the introductory or defining use of a term. For example, `\dfn{environment}` is typeset as *environment*.

Quotations and examples

In addition to the standard LaTeX environments for quotations and examples (such as `quote`, `quotation`, `flushleft`, `center` and `flushright`), the **RJournal** package provides the following environments:

`example` is used to illustrate code, commands, and the like. The text is printed in a fixed-width font, and indented but not filled.

`smallexample` is similar to `example`, except that text is typeset in a smaller font.

These are patterned after the Texinfo environments with the same names. In particular, `\{`, `\}`, and `\\` retain their "usual" meanings and are not treated verbatim, which is not optimal for displaying R code or output. Hence, we also provide a `smallverbatim` environment which works like `verbatim` but uses a smaller font for typesetting.

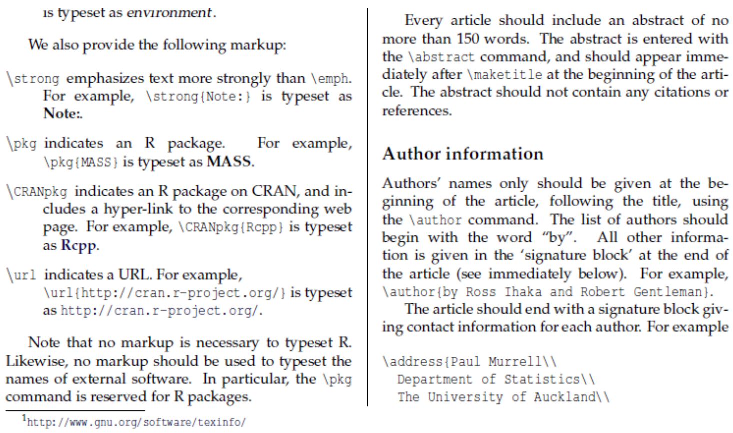
Sectioning, titles, and abstract

Use only `\section` and `\subsection` commands, not `\section*` or `\subsection*`.

The title of the article should be set with initial capitals, as in `\title{Drawing Diagrams with R}`. Only the initial word of section and subsection titles should be capitalized; for example, `\section{Starting at the end}`.

If the title includes a package name, the name should be formatted with the `\pkg` command. This ensures that the package name is correctly typeset when it appears in the Table of Contents of *The R Journal*. Note that `\pkg` is the only markup that should be used inside a title.

Every article should include an abstract of no



is typeset as *environment*.

We also provide the following markup:

`\strong` emphasizes text more strongly than `\emph`. For example, `\strong{Note:}` is typeset as **Note:**.

`\pkg` indicates an R package. For example, `\pkg{MASS}` is typeset as **MASS**.

`\CRANpkg` indicates an R package on CRAN, and includes a hyper-link to the corresponding web page. For example, `\CRANpkg{Rcpp}` is typeset as **Rcpp**.

`\url` indicates a URL. For example, `\url{http://cran.r-project.org/}` is typeset as `http://cran.r-project.org/`.

Note that no markup is necessary to typeset R. Likewise, no markup should be used to typeset the names of external software. In particular, the `\pkg` command is reserved for R packages.

Every article should include an abstract of no more than 150 words. The abstract is entered with the `\abstract` command, and should appear immediately after `\maketitle` at the beginning of the article. The abstract should not contain any citations or references.

Author information

Authors' names only should be given at the beginning of the article, following the title, using the `\author` command. The list of authors should begin with the word "by". All other information is given in the 'signature block' at the end of the article (see immediately below). For example, `\author{by Ross Ihaka and Robert Gentleman}`.

The article should end with a signature block giving contact information for each author. For example

```
\address{Paul Murrell\\
  Department of Statistics\\
  The University of Auckland\\
```

[1] http://www.gnu.org/software/texinfo/

For example, `\code{}` can be used to use a courier-like font for simple in-line code. The example environment can be used for long code examples that are offset from a paragraph.

Important items to notice in my own RJwrapper.tex file:

- The report document class is used where the size of the paper is a4paper (commonly used European size).
- The RJournal.sty file is read in using `\usepackage`.
- A separate `\usepackage` is used to obtain the natbib bibliography style (`http://www.ctan.org/tex-archive/macros/latex/contrib/natbib`).
- The `\input{}` command instructs LaTeX to include the contents of BilderZhangSchaarschmidtTebbs.tex.

Important items to notice in BilderZhangSchaarschmidt-Tebbs.tex:

- There is no preamble because this file is read in by RJwrapper.tex.

- `\citep{}` and `\citet{}` are used to cite items in the bibliography located at the end of the document. The `\citep{}` gives parenthetical citations such as "(Bilder et al. 2010)". The `\citet{}` gives references in the form of "Bilder et al. 2010". Each item in the bibliography has a user-defined name associated with it which is cross-referenced within the {}.
- `\begin{thebibliography}` begins a simple bibliography environment. Each new entry begins with `\bibitem[]{}` where the user-defined name is within {}. The code right after `\begin{thebibliography}{1}` gives more format information for what each bibliographic entry should look like.
- The `\begin{example}` and `\end{example}` code environment allows for long R code examples in a courier-like font.

Biometrics paper

This paper is the final version of McMahan, Tebbs, and Bilder (2012, p. 793-804) that was sent to *Biometrics*. Author instructions for submitting a paper to *Biometrics* are provided at `http://www.biometrics.tibs.org/informationforauthors.html`. Specific instructions for LaTeX are given at `http://www.biometrics.tibs.org/latexdocumentclass.htm`, where a document class file named biom.cls is given. Additional .tex example files are also given. While authors are not required to use LaTeX, it is now STRONGLY preferred.

Important items to notice in MS110604P.tex:

- The document class is biom to correspond to biom.cls. The referee option in `\documentclass[]{}` leads to a PDF file that is easier for referees to examine. When this option is removed, the PDF produced is in the form you see in the actual journal. Note that figure and table placement will not

look correct here.
- Most of the comments in the preamble are those given by *Biometrics* in their biomsample.tex file.
- The eqnarray environment is used for mathematical equations sometimes. This allows for mathematical expressions to line up over multiple rows (think of a 3 column matrix where the equal sign is in column 2).
- The figure environment is used to read in PDF files containing plots. There is also a figure where LaTeX code is used to create a plot.
- The tabular environment is used for tables.
- Note that the figures and tables are given in the .tex file at their approximate locations where the author would like them. However, these items appear at the end of the PDF version of the document. This location change is brought about by the referee document class option.
- The asterisk in `\section*{}` is used to denote a non-numbered section.
- References for this paper are manually typed in rather than cross-referenced. They could be cross-referenced in a similar manner as in the previous paper if desired.

Non-journal paper examples

Next are additional examples that do not necessarily correspond to writing a paper for a journal.

UNL thesis

I found this .zip file at `http://www.math.unl.edu/graduate` under "For Current Students" and "Resources". After unzipping

the file, the test folder gives an example template. Note that you need to have the nuthesis.cls and unl.pdf files (located in the main folder) in the test folder so that the example compiles correctly.

There is also a LyX file template located at the same website.

R and LaTeX

There are a few R packages that create LaTeX code to help include output directly into a LaTeX document. You can go to a list of all R packages at `http://cran.r-project.org/web/packages/available_packages_by_name.html` and search for "latex" to see these packages. The Reproducible Research task view at CRAN (`http://cran.r-project.org/web/views/ReproducibleResearch.html`) also provides information on R packages. We will make use of some of these packages during the LyX and `knitr` discussion later in the semester.