

An Introduction to L<sup>A</sup>T<sub>E</sub>X

India Staff Training, 2013

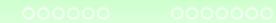
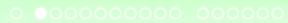
Andreas Tiemann

[atiemann@poverty-action.org](mailto:atiemann@poverty-action.org)



## Research Methods & Training

27 August 2013



Thanks to Max Bode for a previous version of this presentation

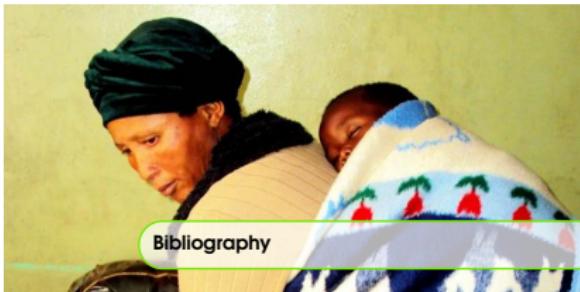
# What is L<sup>A</sup>T<sub>E</sub>X?

- L<sup>A</sup>T<sub>E</sub>X is a document markup language and document preparation system
- The term refers only to the language in which documents are written, not to the editor used to compile and print those documents.
- Standard for creating scientific documents.



Contents

<b>1</b>	<b>Text Chapter</b>	<b>5</b>
<b>1.1</b>	<b>Paragraphs of Text</b>	<b>5</b>
<b>1.2</b>	<b>Citation</b>	<b>6</b>
<b>1.3</b>	<b>Lists</b>	<b>7</b>
<b>1.3.1</b>	<b>Numbered List</b>	<b>7</b>
<b>1.3.2</b>	<b>Bullet Points</b>	<b>7</b>
<b>1.3.3</b>	<b>Descriptions and Definitions</b>	<b>7</b>
<b>2</b>	<b>In-text Elements</b>	<b>9</b>
<b>2.1</b>	<b>Theorems</b>	<b>9</b>
<b>2.1.1</b>	<b>Several equations</b>	<b>9</b>
<b>2.1.2</b>	<b>Single Line</b>	<b>9</b>
<b>2.2</b>	<b>Definitions</b>	<b>9</b>
<b>2.3</b>	<b>Notations</b>	<b>10</b>
<b>2.4</b>	<b>Remarks</b>	<b>10</b>
<b>2.5</b>	<b>Corollaries</b>	<b>10</b>
<b>2.6</b>	<b>Propositions</b>	<b>10</b>
<b>2.6.1</b>	<b>Several equations</b>	<b>10</b>
<b>2.6.2</b>	<b>Single Line</b>	<b>11</b>
<b>2.7</b>	<b>Examples</b>	<b>11</b>
<b>2.7.1</b>	<b>Equation and Text</b>	<b>11</b>
<b>2.7.2</b>	<b>Paragraph of Text</b>	<b>11</b>



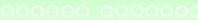
## Bibliography

## Books

[Smi12] John Smith. *Book title*. 1st edition. Volume 3. 2. City: Publisher, Jan. 2012, pages 123–200 (cited on page 6).

## Articles

[Smi13] James Smith, "Article title". In: 14.6 (Mar. 2013), pages 1–8 (cited on page 6).



## Term Structure of Debt and Entrepreneurship: Experimental Evidence from Microfinance

Erica Field, Rohini Pande, John Papp and Natalia Rigol\*

February 25, 2011

### Abstract

Financiers across the world structure debt contracts to limit the risk of entrepreneurial lending. But debt structures that reduce risk may inhibit enterprise growth, especially among the poor. Using a field experiment we quantify the short- and long-run trade-offs associated with the classic microfinance debt contract. We contrast the classic contract which requires that repayment begins immediately after loan disbursement with a contract that provides a two-month grace period before repayment begins. The shift to a grace period contract increased short-run business investments and long-run profits, implying average return to capital of over 8% per month. However, we also observe a significant increase in the variance of profits and a tripling of default rates. In this manner, early initiation of repayment reduces risk to financers but also reduces the potential impact of microfinance on microenterprise growth and household poverty.

1. Invest everything in the risky asset

$$p_g R_g B - D$$

2. Invest only enough in the liquid asset to pay the first installment

$$p_g(R_g(B - P_1/R_L) - P_2) - (1 - p_g)D$$

3. Invest enough in the liquid asset to pay the first and second installments

$$p_g R_g (B - P_1/R_L - P_2/R_L^2)$$

which yield cut-offs for the default cost:

$$D_{hf} \equiv \frac{p_g}{1 - p_g} (R_g/R_L^2 - 1) P_2 \quad (13)$$

$$D_{hs} \equiv p_g R_g (P_1/R_L + P_2/R_L^2) \quad (14)$$

$$D_{fa} \equiv \frac{R_g P_1}{R_L} + P_2 \quad (15)$$

There are two possible orderings of the cut-offs above that do not admit any logical contradictions. Either  $D_{fa} < D_{hs} < D_{hf}$  or  $D_{hf} < D_{hs} < D_{fa}$ . Under the first ordering, for  $D < D_{fa}$ , the borrower will optimally invest all her money in the risky asset. For  $D \in [D_{fa}, D_{hf}]$ , it is optimal to set aside money for just the first installment, and for  $D > D_{hf}$  it is optimal to set aside money for both installments.

Under the second ordering, it is never optimal to set aside money for the first installment only. Under this ordering, the investor switches from setting aside money for neither installment to setting aside money for both installments when  $D$  crosses  $D_{hs}$ . The second

\*The authors are from Harvard University (Field and Pande), Princeton University (Papp) and MIT (Rigol). We thank Emmanuel Davies, Sitaran Mukherjee and Anind Roy for superb field work, the Village Financial Services (VFS) team, known as Village Works Services, and Cognizant for their support in this study. We thank Chee, Arunava Datta, Nandini Mitra and James Oliver for enabling this work. We thank ICICI Foundation, Exxon-Mobil and IGC for funding. We also thank Yenbow Jeanette Park for exceptional research assistance.

## Outline

- 1 Introduction
  - 2 Installation
  - 3 Basics
  - 4 Coding
  - 5 Environments
  - 6 Formulae
  - 7 References
  - 8 Presentations

# Learning Objectives

By the end of this presentation you should

- ① Be able to create first documents in  $\text{\LaTeX}$
- ② Have an idea of what  $\text{\LaTeX}$  is able to do beyond what is covered in this presentation
- ③ Know which resources to consult if you have questions

# Why *not* to use L<sup>A</sup>T<sub>E</sub>X?

- The final result is not visible straight away (“WYSIWYG”)
- High fixed set-up cost of learning language
- Customization can sometimes be difficult
- MS Word has improved its mathematical typeset, bibliographies and footnotes
- Not everyone knows how to use it (PIs do, PAs / RAs don’t)

# Why to use L<sup>A</sup>T<sub>E</sub>X? I

- Clear, explicit separation of content and style
  - Beauty
    - Equations look good and are easily typeset
    - Style is consistent
    - Greater typographical quality
    - Power in your hands: Precise control over everything
  - Structure
    - You are forced to correctly structure your documents
- Automatization
  - Table of Contents, Footnotes and Bibliographies are easily generated
  - Extensive facilities for automating most aspects of typesetting, including numbering and cross-referencing, tables and figures, page layout and references
  - Easy to embed other files and automatically update these files as you go

# Why to use $\text{\LaTeX}$ ? II

- Easy to collaborate with others
  - $\text{\LaTeX}$  is OS or software independent. No formatting changes on different platforms
  - Portability (Windows, MacOS, Unix, Linux, etc.)
  - Flexibility: You may comply with different journal guidelines by changing a simple line of a document
  - Stability and interchangeability of documents (as opposed to Office 97 vs. Office 2010 or Mac vs. PC compatibility program)
- Software
  - It's free!
  - Stable and bug-free
- Many journals and conferences prefer / only accept submissions done in  $\text{\LaTeX}$

# When to use L<sup>A</sup>T<sub>E</sub>X

Suitable for producing neatly formated scientific and mathematical documents:

- Incorporating a bibliography
- Incorporating many figures
- Incorporating large tables
- Incorporating equations
- Intend submitting it to journals
- Intend to create standardized, publishable documents

# What to install I

Mind the order!

Install the software in the following order.

- ➊ Install Adobe Reader (if not already installed) [▶ Link](#)
- ➋ Install the "General Public License (GPL)" version of Ghostscript, appropriate to your operating system (if not already installed) [▶ Link](#)
- ➌ Install what is called a  $\text{\TeX}$  distribution.<sup>1</sup> If you have the choice between a "Basic" and a "Complete" installation, opt for the latter.
  - For Windows: Mi $\text{\TeX}$
  - For Mac OS X: Mac $\text{\TeX}$
  - For Unix/Linux:  $\text{\TeX}$  Live

# What to install II

Mind the order!

## ④ Opt for an editor of your choice

- I recommend using T<sub>E</sub>XStudio on Windows and T<sub>E</sub>XShop under Mac OS X
- Most distributions already come with an editor – MiK<sub>T</sub>E<sub>X</sub> comes with T<sub>E</sub>Xworks, MacT<sub>E</sub>X comes with T<sub>E</sub>XShop
- Your choice is between
  - *Code Interface:* T<sub>E</sub>XStudio vs. T<sub>E</sub>Xworks vs. T<sub>E</sub>XShop
  - *Graphical Interface:* LyX vs. Scientific WorkPlace

## ⑤ Optional: Choose a reference management and citation system such as<sup>2</sup>

- JabRef
- Citavi

---

<sup>1</sup>You can find detailed instructions on SharePoint [Link](#)

<sup>2</sup>You can find a comparison here [Link](#)

# TeXStudio

The screenshot shows the TeXStudio interface with a LaTeX presentation project open. The main window displays the code for `tex_master.tex`, which includes sections for preamble, introduction, installation, basics, coding, environments, and resources, each inputting specific files like `tex_preamble.tex` or `tex_intro.tex`. The left sidebar shows a tree view of the project files. The bottom status bar indicates the process started with `pdflatex.exe -synctex=1 -interaction=nonstopmode "tex_master".tex` and exited normally. The right panel shows a preview of the presentation slide titled "An Introduction to L<sup>A</sup>T<sub>E</sub>X" from "India Staff Training, 2013" by "Andreas Tiemann" at "atiemann@poverty-action.org". The slide content includes a logo for "India Staff Training" and the date "August 7, 2013". The bottom right corner shows the page number "14 / 93".

C:\Users\Andreas\Downloads\LaTeXpresentation\LaTeXpresentation\tex\_master.tex - TeXStudio

File Edit View Tools LaTeX Math Wizards Bibliography Macros View Options Help

Structure

tex\_master.tex

- tex\_preamble.tex
- Intro
- Installation
- tex\_programs.tex
- Basics
- tex\_basics.tex
- Coding
- tex\_coding.tex
- Environments
- tex\_environments.tex
- Maths
- tex\_Maths.tex
- BibTeX
- tex\_bibtex.tex
- Beamer
- tex\_beamer.tex
- Questions
- tex\_questions.tex
- Resources
- tex\_resources.tex

tex\_programs.tex

presentation.tex

- Why LaTeX?
- Why You May ...
- How to Set Up LaTeX...
- First Steps
- Common Commands...
- Graphs and Tables
- Bibliography Manager...
- Conclusion

tex\_intro.tex

tex\_master.tex

tex\_programs.tex

presentation.tex

tex\_intro.tex

```
1 \input{tex_preamble.tex}
2
3
4 \begin{document}
5
6
7 \maketitle
8
9 \section{Intro}
10 \% \input{tex_intro.tex}
11
12
13 \section{Installation}
14 \% \input{tex_programs.tex}
15
16
17 \section{Basics}
18 \% \input{tex_basics.tex}
19
20
21 \section{Coding}
22 \% \input{tex_coding.tex}
23
24
25 \section{Environments}
26 \% \input{tex_environments.tex}
27
28
```

Line: 34 Column: 0 INSERT

Messages Log File Errors Preview Search Results

Process started: pdflatex.exe -synctex=1 -interaction=nonstopmode "tex\_master".tex

Process exited normally

An Introduction to L<sup>A</sup>T<sub>E</sub>X  
India Staff Training, 2013  
Andreas Tiemann  
atiemann@poverty-action.org  
India Staff Training  
Research Methods & Training  
August 7, 2013

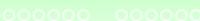
What to install  
Mind the order!

Install the software in the following order.

- Install Adobe Reader (if not already installed)
- Install the "General Public License (GPL)" version of Ghostscript, appropriate to your operating system (if not already installed)
- Install what is called a TeX distribution.<sup>1</sup> If you have the choice between a "Basic" and a "Complete" installation, opt for the

Pages 1 to 3 of 9 71%

en\_US UTF-8 Ready Normal Mode 14 / 93



# TeXShop

The screenshot shows two windows of the TeXShop application. The left window is titled 'TPPC-2008-0065.tex' and the right window is titled 'TPPC-2008-0065.pdf'. Both windows have standard Mac OS X interface elements like title bars, menus, and toolbars.

**Left Window (tex file):**

```

In the paper, we propose a simple approach with basic inequities such as
Cauchy-Schwarz inequality and arithmetic-geometric mean inequality (or more
briefly the AM-GM inequality) to solve Wu and Ouyang's model (%
\citet{WuOuyang2003}). Without using decision calculus or using the
method of completing the square, the solution procedure proposed by using
basic inequities is easier to find the optimal solutions (the buyer's lot
size per order, maximum backorder level and the vendor's number of
deliveries). In addition, the minimum integrated total cost of the proposed
model is obtained more directly.

\section{Model discussion}

\indent In contrast to the method of completing the square adopted by
Wu and Ouyang (\citet{WuOuyang2003}), two basic inequalities (Cauchy-Schwarz
inequality and Arithmetic-Geometric mean inequality) are used to solve the
integrated inventory problems including three decision variables: \$Q\$%
(buyer's lot size per order), \$S\$ (maximum backorder level), \$n\$ (the
vendor's number of deliveries). First, these inequalities are shown shortly
as follows:

\noindent \textbf{Arithmetic-Geometric mean inequality:} Let \$x_{[1]}, \$x_{[2]} \\
\$, \dots, \$x_{[n]}\$ be \$n\$ positive real number, then%
\begin{equation*}
\frac{x_{[1]}+x_{[2]}+\cdots+x_{[n]}}{n} \geq \sqrt[n]{x_{[1]}x_{[2]}\cdots x_{[n]}}
\end{equation*}
with the equality holds if only \$x_{[1]}=x_{[2]}=\cdots=x_{[n]}\$.

\noindent \textbf{Cauchy-Schwarz inequality:} Let \$a_{[1]}, \$a_{[2]}, \dots, \$a_{[n]}\$ \\
\$, \$b_{[1]}, \$b_{[2]}, \dots, \$b_{[n]}\$ be two vectors in \$n\$ space,
then%
\begin{equation*}
\left( a_{[1]}^2 + a_{[2]}^2 + \cdots + a_{[n]}^2 \right)^{1/2} \leq \sqrt{a_{[1]}^2 + a_{[2]}^2 + \cdots + a_{[n]}^2}
\end{equation*}
with the equality holds if only \$a_{[1]}/b_{[1]}=a_{[2]}/b_{[2]}=\cdots=a_{[n]}/b_{[n]}\$.

Now we can begin to discuss the model developed by Wu and Ouyang (%
\citet{WuOuyang2003}). The integrated total annual cost function simplified
by Wu and Ouyang (\citet{WuOuyang2003}) can be written in the form
\begin{equation*}
TC = \frac{dC_b}{Q} + \frac{Q}{2} \left[ H_b \left( 1 - \frac{B}{Q} \right)^2 + S_b \left( \frac{B}{Q} \right)^2 + H_r \left( \frac{2d}{p} - 1 \right) \right] \\
+ \frac{dC_v}{nQ} + \frac{nQH_v}{2} \left( 1 - \frac{d}{p} \right) \\
= \frac{dC_b}{Q} + \frac{dC_v}{nQ} + \frac{QH_v}{2} \left[ (n-1) \left( 1 - \frac{d}{p} \right) + \frac{d}{p} \right]
\end{equation*}

```

3

with the equality holds if only  $a_1/b_1 = a_2/b_2 = \dots = a_n/b_n$ .

**Right Window (pdf file):**

Now we can begin to discuss the model developed by Wu and Ouyang (2003). The integrated total annual cost function simplified by Wu and Ouyang (2003) can be written in the form

the form

$$\begin{aligned}
TC &= \frac{dC_b}{Q} + \frac{Q}{2} \left[ H_b \left( 1 - \frac{B}{Q} \right)^2 + S_b \left( \frac{B}{Q} \right)^2 + H_r \left( \frac{2d}{p} - 1 \right) \right] \\
&\quad + \frac{dC_v}{nQ} + \frac{nQH_v}{2} \left( 1 - \frac{d}{p} \right) \\
&= \frac{dC_b}{Q} + \frac{dC_v}{nQ} + \frac{QH_v}{2} \left[ (n-1) \left( 1 - \frac{d}{p} \right) + \frac{d}{p} \right]
\end{aligned}$$

(1)

The Cauchy-Schwarz and AM-GM inequalities imply that

$$\begin{aligned}
TC &= \frac{dC_b}{Q} + \frac{dC_v}{nQ} + \frac{QH_v}{2} \left[ (n-1) \left( 1 - \frac{d}{p} \right) + \frac{d}{p} \right] \\
&= Q \left[ \sqrt{\frac{dC_b}{Q}} \left( 1 - \frac{B}{Q} \right)^2 + \sqrt{\frac{dC_v}{nQ}} \left( 1 - \frac{d}{p} \right)^2 + \sqrt{\frac{QH_v}{2}} \left( \frac{B}{Q} \right)^2 \right]
\end{aligned}$$



LyX - my schedule.lyx (version current) (changed)

File Edit View Insert Navigate Document Tools Help

Standard Extended Math UserGuide\*

### 5.1.6 Operators with Limits [Idx](#) [Idx](#) sub:Operators-with-Limits

Sum  $\Sigma$  and integral  $\int$  operators are very often decorated with limits. These limits can be entered in LyX by entering them as you would enter a super- or subscript, directly after the symbol. The sum operator will automatically place its "limits" over and under the symbol in displayed formulas, and on the side in inline formulas. Such as  $\sum_{n=0}^{\infty} \frac{1}{n!} = e$ , versus

$$\sum_{n=0}^{\infty} \frac{1}{n!} = e$$

Integral signs, however, will place the limits on the side in both formula types.

All operators with limits will be automatically re-sized when placed in display mode. The placement of the limits can be changed by placing the cursor directly behind the operator and hitting M-m l or using the menu **Edit > Math > Change\_Limits\_Type**.

Certain other mathematical expressions have this "moving limits" feature as addition, such as [Idx](#)

$$\lim_{x \rightarrow \infty} f(x),$$

which will place the  $x \rightarrow \infty$  underneath the "lim" in display mode. In inline formulas it looks like this:  $\lim_{x \rightarrow \infty} f(x)$ .

Note that the lim-function was entered as the function macro `\lim`. Have a look at section [Ref:sub:Functions](#) for an explanation of function macros.

### 5.1.7 Math Symbols [Idx](#)

Font: Default

# Scientific WorkPlace

The fact that the Adobe Reader is so common that many readers may have downloaded it already.

2. *The author must manually add hyperlinks into the file.* Web development becomes more time-consuming when manual processes are involved.

### Latex2Html

All files produced by Scientific WorkPlace, Scientific Word, and Scientific Notebook are LaTeX files. LaTeX is a mathematical typesetting language. Latex2Html is a freeware program that converts LaTeX files to HTML. Since HTML is not able to display mathematics directly, Latex2Html converts mathematics to graphics (GIF) files.

#### Advantages of using Latex2Html

1. *The results will display, with some problems, in any browser since all browsers support the combination of HTML and graphics that is produced.*
2. *This solution is inexpensive for the author and the readers.* The author's program is freely available on the web, and the readers do not need anything in addition to their current browsers.

#### Disadvantages of using Latex2Html

The conversion of mathematics to graphics causes several problems:

1. *The file sizes grow quickly when a document contains much mathematics in the document.* Large documents slow the browsing of your web. If your web consists of more than 30 or 40 pages, your readers will save time in the long run by downloading Scientific Viewer.
2. *The graphics files are compressed bitmap.* They will look acceptable on the screen, but when they are printed they will look "dotty" and grainy.
3. *The mathematics graphics files will match only one size of text.* Web browsers allow users to select the magnification of the text. However, because the graphics files will match only a single text size, they may look small compared to the text size chosen by one user and large compared to the text size chosen by another user.
4. *Visually impaired users will be unable to magnify the mathematics graphics files.*
5. *The baselines of text lines and mathematics in the graphics files will not always line up.*

### Hevea

Hevea is a freeware program that converts LaTeX files to HTML, without using graphics. It uses characters from the Symbol font to represent some mathematics; however, because many common mathematical symbols are not in the Symbol font, they will not appear.

#### Advantages of using Hevea

1. *Some simple mathematics is converted to true HTML.* Depending on your requirements, this may be adequate.
2. *The resulting files are small and download quickly.*
3. *This solution is inexpensive for both the author and the readers.* The author's program is freely available on the web, and the readers do not need anything in addition to their browsers.

# Folder Structure

Create a new folder for every single document you create because

...

- In this way your compiler/editor can find all input files, and
- $\text{\LaTeX}$  produces all sorts of files which make your folder very messy.
- It makes it easy to share documents on Dropbox
- You may use a standardized system of sub-folders, which helps you organize your included files (tables, graphs, etc.)

# File Types

- You must edit
  - .tex - the article, presentation, book written in  $\text{\TeX}$
  - .bib - your bibliography
- You may edit/create
  - figures: pictures, graphs
  - other input files
  - note that you may automatize how some embedded input files are created (e.g. Stata can write output to  $\text{\TeX}^3$ )

---

<sup>3</sup>You can find further instructions here [Link](#)

# File Types

- You must edit
  - .tex - the article, presentation, book written in  $\text{\TeX}$
  - .bib - your bibliography
- You may edit/create
  - figures: pictures, graphs
  - other input files
  - note that you may automatize how some embedded input files are created (e.g. Stata can write output to  $\text{\TeX}^3$ )
- You must not edit
  - .sty and .cls - formatting information
  - .bst (bibliography styles)

---

<sup>3</sup>You can find further instructions here [Link](#)

# File Types

- You must edit
  - .tex - the article, presentation, book written in  $\text{\TeX}$
  - .bib - your bibliography
- You may edit/create
  - figures: pictures, graphs
  - other input files
  - note that you may automatize how some embedded input files are created (e.g. Stata can write output to  $\text{\TeX}^3$ )
- You must not edit
  - .sty and .cls - formatting information
  - .bst (bibliography styles)
- Other files
  - .dvi - device independent. Contain a preview of your document once it is compiled
  - .log - contain a transcript of the compilation process

---

<sup>3</sup>You can find further instructions here [Link](#)

# File Types

- You must edit
  - .tex - the article, presentation, book written in  $\text{\TeX}$
  - .bib - your bibliography
- You may edit/create
  - figures: pictures, graphs
  - other input files
  - note that you may automatize how some embedded input files are created (e.g. Stata can write output to  $\text{\TeX}^3$ )
- You must not edit
  - .sty and .cls - formatting information
  - .bst (bibliography styles)
- Other files
  - .dvi - device independent. Contain a preview of your document once it is compiled
  - .log - contain a transcript of the compilation process

---

<sup>3</sup>You can find further instructions here

▶ Link

# Document Structure

A  $\text{\LaTeX}$  document is comprised of two parts:

## ① The Preamble

```
1 | \documentclass{ }  
2 | ...  
3 | \usepackage{ }  
4 | ...  
5 | \title{ }  
6 | \author{ }  
7 | \date{ }
```

## ② The Body

```
1 | ...
```

If you omit the **\date** command today's date will be assigned automatically.

# Document Classes

- Start every  $\text{\LaTeX}$  file by specifying the document class
- .cls files specify the format of a specific type of document document. $\text{\LaTeX}$  comes with four different document classes:
  - article - Good for papers, short reports, shorter documents
  - report - Good for longer docs like dissertations, theses
  - book - Good for writing longer books with many chapters
  - beamer - Presentations
  - res - CVs and Resumes
  - letter - This is a simple way of writing a well-formatted letter.
- These are mostly similar with some small differences. For instance, the book class allows for chapters and the article class allows for abstracts.

## Example

```
1 | \documentclass{article}
```

# Packages

- Add-on features for LaTeX are known as packages
- Remember, they go into the preamble
- A lot of packages exist, the most important are:
  - babel for the internationalization of  $\text{\LaTeX}$ , mandatory
  - geometry for easy management of document margins
  - graphicx to manage external pictures
  - comments to comment out larger sections of code

## Example

```
1 | \usepackage[english]{babel}
```

# Document Structure

A  $\text{\LaTeX}$  document is comprised of two parts:

## ① The Preamble

```
1 | \documentclass{ }  
2 | ...  
3 | \usepackage{ }  
4 | ...  
5 | \title{ }  
6 | \author{ }  
7 | \date{ }
```

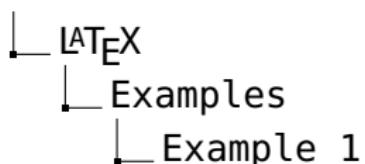
## ② The Body

```
1 | \begin{document}  
2 | \maketitle  
3 |  
4 | % Body of document  
5 |  
6 | \end{document}
```

Comments start with **%** and end at the end of the line.

# Try It Yourself: Your First Document

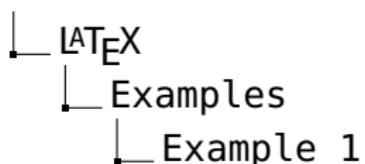
- Open the following document either after downloading it to its own folder [Link](#) or by accessing it in your training folders:



- Note the components we just discussed
  - This file is kept in its own folder
  - Document structure
  - Content used in the preamble (e.g. packages)
  - Content used in the body (e.g. `\maketitle`)
  - Comments
- “Build and view” (hit the green double arrow or simply press F1) and receive your very first document!

# Try It Yourself: Your First Document

- Open the following document either after downloading it to its own folder [Link](#) or by accessing it in your training folders:



- Note the components we just discussed
  - This file is kept in its own folder
  - Document structure
  - Content used in the preamble (e.g. packages)
  - Content used in the body (e.g. `\maketitle`)
  - Comments
- “Build and view” (hit the green double arrow or simply press F1) and receive your very first document!

# Table of Contents and Sections I

Code is organized depending on the logical structure of the content:

Command	Level
\part{this is a part}	-1
\chapter{this is a chapter}	0
\section{this is a section}	1
\subsection{this is a subsection}	2
\subsubsection{this is a subsubsection}	3
\paragraph{this is a paragraph}	4
\ subparagraph{this is a subparagraph}	5

Note:

- **\chapter** only exists for book and report classes.
- Try the “part” button in TeXStudio to quickly choose any of the above

# Table of Contents and Sections II

- Table of Contents in  $\text{\LaTeX}$  can be generated automatically using the `\tableofcontents` command.
- Place the command wherever you want the table of contents to appear. This is usually right after the `\maketitle` command.
- The table is compiled based on the entries from the sectioning commands.
- You must run the  $\text{\LaTeX}$  command twice to generate the ToC whenever you add new entries to it. The first time the entries are recorded in an `.aux` file. The second time they are actually typeset.

# Table of Contents and Sections III

```
1 % Table of Contents
2 %*****
3 \tableofcontents{}
4
5 % Text
6 %*****
7 \section{Section1}
8 \subsection{Subsection A}
9 \subsubsection{Subsubsection a}
10 \section{Section2}
11 \subsection{Subsection A}
12 \appendix
13 \section*{Appendix}
```

# Font Size

Ten local environments are available by default to change font size:

Command	Size
<code>\begin{tiny}... \end{tiny}</code>	<code>tiny</code>
<code>\begin{scriptsize}... \end{scriptsize}</code>	<code>scriptsize</code>
<code>\begin{footnotesize}... \end{footnotesize}</code>	<code>footnotesize</code>
<code>\begin{small}... \end{small}</code>	<code>small</code>
<code>\begin{normalsize}... \end{normalsize}</code>	<code>normalsize</code>
<code>\begin{large}... \end{large}</code>	<code>large</code>
<code>\begin{Large}... \end{Large}</code>	<code>Large</code>
<code>\begin{LARGE}... \end{LARGE}</code>	<code>LARGE</code>
<code>\begin{huge}... \end{huge}</code>	<code>huge</code>
<code>\begin{Huge}... \end{Huge}</code>	<code>Huge</code>

Note:

- Try the “tiny” button in TeXStudio to quickly choose any of the above
- You can also use it like this: `\tiny{tiny test}`.

# Font Face

Look at your  $\text{\LaTeX} 2\epsilon$  Cheat Sheet for more options.

Command	Deceleration	Style
<code>\textit{...}</code>	<code>{\itshape ... }</code>	<i>italic</i>
<code>\textsl{...}</code>	<code>{\slshape ... }</code>	<i>slanted</i>
<code>\emph{...}</code>	<code>{\em ... }</code>	<i>emphasize</i>
<code>\textbf{...}</code>	<code>{\bfseries ... }</code>	<b>boldface</b>
<code>\texttt{...}</code>	<code>{\ttfamily ... }</code>	<i>typewriter</i>
<code>\textsc{...}</code>	<code>{\scfamily ... }</code>	<i>small caps</i>
<code>\underline{...}</code>		<u>underline</u>

# Positioning

```
1 | \begin{center}
```

```
2 | This text is centered.
```

```
3 | \end{center}
```

This text is centered.

```
1 | \begin{flushright}
```

```
2 | This text is flushright.
```

```
3 | \end{flushright}
```

This text is flushright.

```
1 | \begin{flushleft}
```

```
2 | This text is flushleft.
```

```
3 | \end{flushleft}
```

This text is flushleft.

# Footnotes

You can include footnotes in your document by using the command

```
1 | \footnote[number]{text}
```

The footnote is automatically placed at the bottom of the page and is automatically given a number. You can override the automatic numbering by using the optional [number] portion of the footnote command.

## Example:

```
1 | What is the answer to the Ultimate Question of Life , the  
    Universe , and Everything?\footnote[42]{Is this the  
    answer to everything?}
```

What is the answer to the Ultimate Question of Life, the Universe, and Everything?<sup>42</sup>

---

<sup>42</sup>Is this the answer to everything?

# Footnotes

You can include footnotes in your document by using the command

```
1 | \footnote[number]{text}
```

The footnote is automatically placed at the bottom of the page and is automatically given a number. You can override the automatic numbering by using the optional [number] portion of the footnote command.

## Example:

```
1 | What is the answer to the Ultimate Question of Life , the  
    Universe , and Everything?\footnote[42]{Is this the  
    answer to everything?}
```

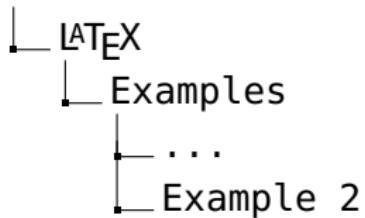
What is the answer to the Ultimate Question of Life, the Universe, and Everything?<sup>42</sup>

---

<sup>42</sup>Is this the answer to everything?

# Try It Yourself: A Document With A Lot of Formatting

- Open the following document either after downloading it to its own folder [▶ Link](#) or by accessing it in your training folders:



- Note the components we just discussed
  - Table of Contents and Sections
  - Font Size and Font Face
  - Positioning
  - Footnotes

# Typical Issues for Beginners

- Extra whitespace in .tex or .bib will not show in end-result → use-as-you-please
- Separate paragraphs using blank line or \\
- The *magic* characters ({ } \$ ^ \_ % ~ # \ & ) must be preceded by the *Escape Character* \ because L<sup>A</sup>T<sub>E</sub>X reserves them for special purposes. → Don't use them in file names of input files!
- General Rule: Don't be overwhelmed and rely on online resources

# Typical Issues for Beginners

- Extra whitespace in .tex or .bib will not show in end-result → use-as-you-please
- Separate paragraphs using blank line or \\
- The *magic* characters ({ } \$ ^ \_ % ~ # \ & ) must be preceded by the *Escape Character* \ because L<sup>A</sup>T<sub>E</sub>X reserves them for special purposes. → Don't use them in file names of input files!
- General Rule: Don't be overwhelmed and rely on online resources

# Lists

- ❶ You can enumerate using the `enumerate` environment
- ❷ Numbering happens automatically
  - You can use bullet points using the `itemize` environment

```
1 \begin{enumerate}
2 \item You can enumerate using the enumerate environment
3 \item Numbering happens automatically
4 \end{enumerate}
5
6 \begin{itemize}
7 \item You can use bullet points using the itemize
     environment
8 \end{itemize}
```

# Environments

enumerate and itemize are environments.

## Question

Which other environment do you know?

## Answer

Your whole document is one large environment!

Remember \begin{document} ... \end{document}

# Environments

enumerate and itemize are environments.

## Question

Which other environment do you know?

## Answer

Your whole document is one large environment!

Remember \begin{document} ... \end{document}

# Nesting of Lists and Environments

- ❶ Note that you can include as many environments within environments...
- ❷ and lists within lists.
  - ❸ Level 2 item
    - ❹ Level 3 item

```
1 \begin{enumerate}
2     \item Note that you can include as many environments
3         within environments...
4         \item and lists within lists.
5         \begin{enumerate}
6             \item Level 2 item
7             \begin{itemize}
8                 \item Level 3 item
9             \end{itemize}
10        \end{enumerate}
11    \end{enumerate}
```

# Figures and Graphics

## Including Graphics

$\text{\LaTeX}$  is able to manage graphics via an external package called `graphicx`.

```
1 | \usepackage{graphicx}
```

The `graphicx` package allows you to include a graphic in your document and to...

- Use several different file formats
- Scale or specify dimensions of the image
- Crop the image
- Rotate the image

# Figures and Graphics

## Allowed Formats

- If you compile with LaTeX you can only use the .eps image format
- If you compile with pdfLaTeX you can use .jpg, .png, and .pdf formats

# Figures and Graphics

Use this command to include a graphic in your document:

```
1 | \includegraphics[dimension]{file}
```

The optional [dimension] argument can include several different options including:

- width and height
- scale
- angle
- trim

Warning: The file you are importing must be in the same folder your .tex document is in!

# Figures and Graphics

## Example 1

```
1 | \includegraphics[scale=0.07]{ctan_lion_600.jpg}
```



## Figures and Graphics

## Example II

```
1 | \includegraphics[width=6cm, height=4cm]{ctan_lion_600.jpg}
```



# Figures and Graphics

## Including Figures

- Figures are automatically numbered
- An updated List of Figures is maintained and may be inserted along with your Table of Contents
- You can also include captions with your figures by using the **\caption** command and package

```
1 \begin{figure}  
2 \caption{}  
3 ...  
4 \end{figure}
```

There are a few optional commands that manually place the figure:

- h - put figure here
- t - put figure at top of page
- b - put figure at bottom of page
- p - put figure on separate page

# Figures and Graphics

## Example

```
1 \usepackage{graphicx}
2 \usepackage{caption}
3 ...
4 \begin{figure}[h]
5 \caption{\TeX{} Lion}
6 \includegraphics[scale
7 =0.07]{ctan_lion
     _600.jpg}
\end{figure}
```

Figure 1 :  $\text{\TeX}$  Lion



# Tables

Looks Nice But ...

Table 1 : A Complex Table

$k$	$x_1^k$	$x_2^k$	$x_3^k$	remarks
0	-0.3	0.6	0.7	
1	0.47102965	0.04883157	-0.53345964	*
2	0.49988691	0.00228830	-0.52246185	$s_3$
3	0.49999976	0.00005380	-0.52365600	
4	0.5	0.00000307	-0.52359743	$\epsilon < 10^{-5}$
7	0.5	0	-0.52359878	$\epsilon < \xi$

# Tables

## Perhaps Too Complex

```
1 | \begin{tabular}{|c|ccc|r|}\hline
2 | $k\$ & $x\_1^k\$ & $x\_2^k\$ & $x\_3^k\$ & remarks \\ \hline
3 | 0 & -0.3 & 0.6 & 0.7 & \\
4 | 1 & 0.47102965 & 0.04883157 & -0.53345964 & *\\
5 | 2 & 0.49988691 & 0.00228830 & -0.52246185 & $s\_3\$ \\ \hline
6 | 3 & 0.49999976 & 0.00005380 & -0.52365600 & \\
7 | 4 & 0.5 & 0.00000307 & -0.52359743 & $\epsilonpsilon<10^{-5}\\
8 | \$ \\ \hline
9 | 7 & 0.5 & 0 & -0.52359878 & $\epsilonpsilon<\xi\$ \\ \hline
10 | \end{tabular}
```

# Tables

Luckily...

Luckily you don't have to create tables by hand. You can either

- Export tables straight from Excel, using an add-in for Excel called "Excel2LaTeX"
- Use Stata to create tables
- Export tables straight from OpenOffice's Calc, using an add-in for Calc called "Calc2LaTeX" (not shown here)
- Export tables using an open-source alternative to Excel called Gnumeric (not shown here)
- Use R and "xtable" to create tables (not shown here)

In all cases, the resulting code can either be copy-pasted or included as extra .tex files, using the **\input** command.

# Tables

Luckily...

Luckily you don't have to create tables by hand. You can either

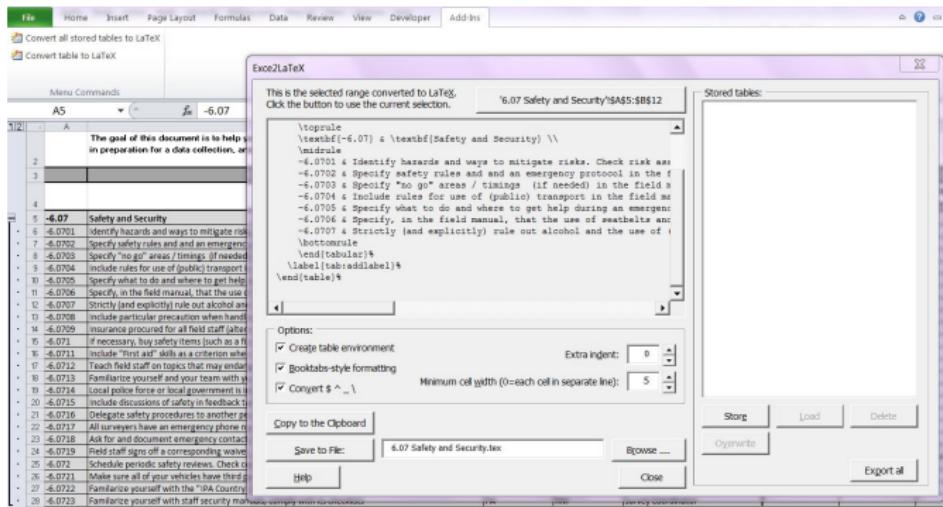
- Export tables straight from Excel, using an add-in for Excel called "Excel2LaTeX"
- Use Stata to create tables
- Export tables straight from OpenOffice's Calc, using an add-in for Calc called "Calc2LaTeX" (not shown here)
- Export tables using an open-source alternative to Excel called Gnumeric (not shown here)
- Use R and "xtable" to create tables (not shown here)

In all cases, the resulting code can either be copy-pasted or included as extra .tex files, using the **\input** command.

# Tables From Excel

## Embedding Excel Tables In L<sup>A</sup>T<sub>E</sub>X

- 1 Download and install the Excel add-in Excel2LaTeX [Link](#)
- 2 Include the copied code or the saved file in your document



# Tables From Stata I

## Embedding Stata Tables In $\text{\LaTeX}$

- ➊ In Stata: Outsheet summary stat or regression table file using tabout, estout etc.
- ➋ In Stata (optional): Create  $\text{\LaTeX}$  code in Stata
- ➌ In Stata (optional): Outsheet this code as .tex file
- ➍ In  $\text{\LaTeX}$ : Import table by either...
  - Typing out  $\text{\LaTeX}$  code to call table files
  - Copy/Pasting  $\text{\LaTeX}$  code from Stata output windows
  - Calling up compiler file which produces Table Appendix

# Tables From Stata II

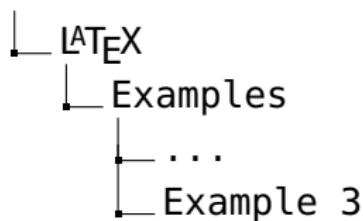
## Embedding Stata Tables In L<sup>A</sup>T<sub>E</sub>X

### Example of Step 4

```
1 \begin{sidewaystable}
2   \centering
3   \caption{Total business profits , last month, INR –
4     Loan Amount}
5   \input{reg_ols_c01_income_hh_ind1}
6 \end{sidewaystable}
```

# Try It Yourself: A Document With Lists, Graphs, and a Table

- Open the following document either after downloading it to its own folder [Link](#) or by accessing it in your training folders:



- Note the components we just discussed
  - Lists
  - Environments
  - Graphs and Figures
  - An embedded table document (created with Excel2LaTeX)

# Typesetting Formulae in L<sup>A</sup>T<sub>E</sub>X

## Amsmath Package

- `amsmath`, `amssymb` and `amsthm` for mathematical symbols
- If you use mathematics heavily in your documents, you might consider using the `amsmath` package. It provides some enhancements to the normal L<sup>A</sup>T<sub>E</sub>X math capabilities which make typesetting formulas easier and more attractive.
- Go here for more info: [▶ Link](#)

# Math Environments I

To typeset mathematical formulae, you must put  $\text{\LaTeX}$  into math mode. There are four different types of math mode:

## ① **Math environment** - Short in-line equations

```
1 | \begin{math} ... \end{math}  
2 | (...)   
3 | $ ... $
```

## ② **Displaymath environment** - Centered equations

```
1 | \begin{displaymath} ... \end{displaymath}  
2 | [...]   
3 | $$ ... $$
```

# Math Environments II

- ③ **Eqnarray environment** - Sequences of equations or very long equations

```
1 | \begin{eqnarray} [*] \end{eqnarray}
```

- ④ **Equation environment** - Numbered equations set apart in the text

```
1 | \begin{equation} \end{equation}
```

## Equations are Easy

## **Powers and indices:**

```

1 | \begin{equation}
2 | k_{n+1} = n^2 + k_n^2 - k_{n-1} \quad k_{n+1} = n^2 + k_n^2 - k_{n-1} \quad (1)
3 | \end{equation}

```

## Fractions and binomials:

```

1 \begin{equation}
2 \frac{n!}{k!(n-k)!} = \binom{n}{k} \quad \frac{n!}{k!(n-k)!} = \binom{n}{k} \quad (2)
3 \end{equation}

```

## **Roots:**

```

1 | \begin{equation}
2 | \sqrt[n]{1+x+x^2+x^3+\dots} \quad (3)
3 | \end{equation}

```

# You can do almost anything you want!

## Sums:

```
1 | \begin{equation}
2 | \sum_{i=1}^{10} t_i
3 | \end{equation}
```

$$\sum_{i=1}^{10} t_i \quad (4)$$

## Integrals:

```
1 | \begin{equation}
2 | \int_0^{\infty} e^{-x} \ , dx
3 | \end{equation}
```

$$\int_0^{\infty} e^{-x} , dx \quad (5)$$

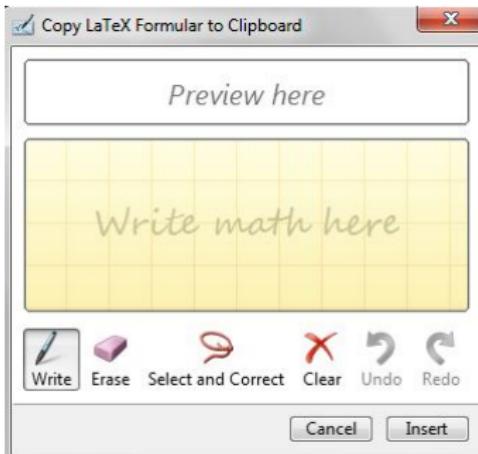
## Automatic bracket sizing:

```
1 | \begin{equation}
2 | \left( \frac{x^2}{y^3} \right)
3 | \end{equation}
```

$$\left( \frac{x^2}{y^3} \right) \quad (6)$$

# Try Equations Using the TeXStudio Maths Wizard

Go to Wizards » Math Assistant ...



# Try Equations Online

<http://www.codecogs.com/latex/eqneditor.php>

The screenshot shows the "Online LaTeX Equation Edit" window from www.codecogs.com/latex/eqneditor.php. The interface includes a toolbar with various mathematical symbols and functions, a code editor containing LaTeX code for matrix multiplication, and a preview area showing the resulting mathematical expression.

Toolbar icons include: Bold, Italic, Underline, Clear, Colors..., Functions..., Examples, History, Favorites, and a Help icon.

Code Editor:

```
$$\left[ \begin{array}{cccc} a_{11} & a_{12} & \cdots & a_{1n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{array} \right] \left[ \begin{array}{c} x_1 \\ \vdots \\ x_n \end{array} \right] = \left[ \begin{array}{c} 0 \\ \vdots \\ 0 \end{array} \right]
```

Preview Area:

$$\left[ \begin{array}{cccc} a_{11} & a_{12} & \cdots & a_{1n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{array} \right] \left[ \begin{array}{c} x_1 \\ \vdots \\ x_n \end{array} \right] = \left[ \begin{array}{c} 0 \\ \vdots \\ 0 \end{array} \right]$$

[Click here to Download Image \(GIF\)](#)

# Reference Management and Citations

## BIBTEX - How to stay honest

- TEX offers a great way to include references in a document and to change citation / bibliography styles on the fly
- Bibliographic entries must be kept in a separate file, the .bib file

```
1 @article{FiLePaVi08AER,
2   title={Segregation, rent control, and riots: the
3         economics of religious conflict in an Indian city},
4   author={Field, E. and Levinson, M. and Pande, R. and
5         Visaria, S.},
6   journal={The American Economic Review},
7   volume={98},
8   number={2},
9   pages={505—510},
10  year={2008},
11  publisher={JSTOR}
12 }
```

# How to create a .bib file

Get  $\text{\LaTeX}$  Citations from Google Scholar!

- ➊ Go to <http://scholar.google.com/>
- ➋ Click on *Settings*
- ➌ Scroll down to the bottom and look for *Bibliography Manager*
- ➍ Enable the citation links, and choose the  $\text{\LaTeX}$  format
- ➎ Copy/paste citation into .bib file
  - either manually directly into the .bib file (order doesn't matter),
  - or into JabRef (New  $\text{\LaTeX}$  entry →  $\text{\LaTeX}$  source) / the reference management software of your choice

# Citing in Style

Field et. al (2008)

```
1 | \cite{FiLePaVi08AER}
```

Use natbib package for other fancy styles:

```
1 | \usepackage{natbib}
```

# Citing in Style

Field et. al (2008)

```
1 | \cite{FiLePaVi08AER}
```

Use natbib package for other fancy styles:

```
1 | \usepackage{natbib}
```

Field, Levinson, Pande, and Visaria (2008)

```
1 | \citet*{FiLePaVi08AER}
```

# Citing in Style

Field et. al (2008)

```
1 | \cite{FiLePaVi08AER}
```

Use natbib package for other fancy styles:

```
1 | \usepackage{natbib}
```

Field, Levinson, Pande, and Visaria (2008)

```
1 | \citet*{FiLePaVi08AER}
```

(2008)

```
1 | \citeyearpar{FiLePaVi08AER}
```

# Citing in Style

Field et. al (2008)

```
1 | \cite{FiLePaVi08AER}
```

Use natbib package for other fancy styles:

```
1 | \usepackage{natbib}
```

Field, Levinson, Pande, and Visaria (2008)

```
1 | \citet*{FiLePaVi08AER}
```

(2008)

```
1 | \citeyearpar{FiLePaVi08AER}
```

(Field et al., 2008; Pande, 2010)

```
1 | \citep{FiLePaVi08AER, Pa10AER}
```

# Citing in Style

Field et. al (2008)

```
1 | \cite{FiLePaVi08AER}
```

Use natbib package for other fancy styles:

```
1 | \usepackage{natbib}
```

Field, Levinson, Pande, and Visaria (2008)

```
1 | \citet*{FiLePaVi08AER}
```

(2008)

```
1 | \citeyearpar{FiLePaVi08AER}
```

(Field et al., 2008; Pande, 2010)

```
1 | \citep{FiLePaVi08AER, Pa10AER}
```

... and many more options.

# Citing in Style

Field et. al (2008)

```
1 | \cite{FiLePaVi08AER}
```

Use natbib package for other fancy styles:

```
1 | \usepackage{natbib}
```

Field, Levinson, Pande, and Visaria (2008)

```
1 | \citet*{FiLePaVi08AER}
```

(2008)

```
1 | \citeyearpar{FiLePaVi08AER}
```

(Field et al., 2008; Pande, 2010)

```
1 | \citep{FiLePaVi08AER, Pa10AER}
```

... and many more options.

# Creating and Styling Your Bibliography

**Create Bibliography:** To make the bibliography appear in your document, include these commands at the end where you want the bibliography to go:

```
1 | \bibliography{filename}  
2 | \bibliographystyle{te}
```

**Bibliography styles:** There are several different options for the `bibliographystyle` command. It is also possible to define the style of the bibliography using external custom style files.

# Creating and Styling Your Bibliography

**Create Bibliography:** To make the bibliography appear in your document, include these commands at the end where you want the bibliography to go:

```
1 | \bibliography{filename}  
2 | \bibliographystyle{te}
```

**Bibliography styles:** There are several different options for the `bibliographystyle` command. It is also possible to define the style of the bibliography using external custom style files.

# Compiling the Bibliography

Compiling with a bibliography is a little bit complicated

- ➊ run  $\text{\LaTeX}$  on the .tex file
- ➋ run  $\text{\BIBTeX}$  on the .tex file
- ➌ run  $\text{\LaTeX}$  twice more

- **Why?** The first time you run  $\text{\LaTeX}$ , an .aux file is created which  $\text{\BIBTeX}$  will subsequently read. The subsequent  $\text{\LaTeX}$  runs allow  $\text{\LaTeX}$  to resolve all of the references between the .tex and .bib files.
- Each time you add new references to your document you must repeat this process.

# Compiling the Bibliography

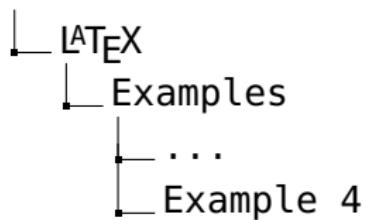
Compiling with a bibliography is a little bit complicated

- ➊ run  $\text{\LaTeX}$  on the .tex file
- ➋ run  $\text{\BIBTeX}$  on the .tex file
- ➌ run  $\text{\LaTeX}$  twice more

- **Why?** The first time you run  $\text{\LaTeX}$ , an .aux file is created which  $\text{\BIBTeX}$  will subsequently read. The subsequent  $\text{\LaTeX}$  runs allow  $\text{\LaTeX}$  to resolve all of the references between the .tex and .bib files.
- Each time you add new references to your document you must repeat this process.

# Try It Yourself: A Document With Formulae, Citations, and a Bibliography

- Open the following document either after downloading it to its own folder [▶ Link](#) or by accessing it in your training folders:



- Note the components we just discussed
    - Different math modes and the use of formulae
    - Different types of citations
    - The bibliography

# Presentations in L<sup>A</sup>T<sub>E</sub>X

You can use L<sup>A</sup>T<sub>E</sub>X to prepare professional looking presentations.  
There are several packages to do this, including:

- Beamer
- Prosper
- Ppower4

The Beamer class allows you to easily create professional looking presentations that are

- Easily customized
- Capable of displaying sophisticated mathematics
- Capable of containing overlays
- Easily converted to handouts.
- Display independent of operating system
- Most PIs use beamer

# Presentations in L<sup>A</sup>T<sub>E</sub>X

You can use L<sup>A</sup>T<sub>E</sub>X to prepare professional looking presentations.  
There are several packages to do this, including:

- Beamer
- Prosper
- Ppower4

The Beamer class allows you to easily create professional looking presentations that are

- Easily customized
- Capable of displaying sophisticated mathematics
- Capable of containing overlays
- Easily converted to handouts.
- Display independent of operating system
- Most PIs use beamer

# Using Beamer

In order to use the Beamer Class you must use it as the document class option in the preamble:

```
1 | \documentclass{beamer}  
2 | \usetheme{}
```

In the `\usetheme{}` command you can specify a number of different themes.<sup>4</sup> If you exclude the command Beamer will use a default style.

---

<sup>4</sup>See this website for an overview of themes

[Link](#)

# Creating a Slide I

To create slides using Beamer you must use the frame environment.

```
1 | \begin{frame}[options]  
2 | ...  
3 | \end{frame}
```

The [options] parameter can be used to specify a number of features:

- `allowframebreaks` will allow Beamer to create extra slides to accommodate overflow text
- `shrink` will shrink contents to fit onto one slide

## Creating a Slide II

## Long Example

```
1 \section{}
2 \subsection{}
3   \begin{frame}
4 \frametitle{"TITLE"}
5 \framesubtitle{"SUBTITLE"}
6 ...
7 \end{frame}
```

## Short Example

```
1 \section{}
2 \subsection{}
3 \begin{frame}["TITLE"][]
4     SUBTITLE"
5 ...
6 \end{frame}
```

# Simple Overlay Example

Beamer allows you to create overlays in your slide presentations.  
The overlays can be simple or intricate.

- First item
- Second item

# Simple Overlay Example

Beamer allows you to create overlays in your slide presentations.  
The overlays can be simple or intricate.

- First item
- Second item
- Third item

# Simple Overlay Example

Beamer allows you to create overlays in your slide presentations.  
The overlays can be simple or intricate.

- First item
- Second item
- Third item

```
1 \begin{itemize}
2   \item First item \pause
3   \item Second item
4     \pause
5   \item Third item
6 \end{itemize}
```

# Simple Overlay Example

Beamer allows you to create overlays in your slide presentations.  
The overlays can be simple or intricate.

- First item
- Second item
- Third item

```
1 \begin{itemize}
2   \item First item \pause
3   \item Second item
4     \pause
5   \item Third item
6 \end{itemize}
```

# More Complex Overlay Example

## Example I

[t] First

```
1 | \only<1>{ First }\only<2>{ Second }\only<3>{ Third }
```

## Example II

[b] I am not here

```
1 | \alt<5>{ I am here }{ I am not here }
```

# More Complex Overlay Example

## Example I

[t] Second

```
1 | \only<1>{ First }\only<2>{ Second }\only<3>{ Third }
```

## Example II

[b] I am not here

```
1 | \alt<5>{ I am here }{ I am not here }
```

# More Complex Overlay Example

## Example I

[t] Third

```
1 | \only<1>{ First }\only<2>{ Second }\only<3>{ Third }
```

## Example II

[b] I am not here

```
1 | \alt<5>{ I am here }{ I am not here }
```

# More Complex Overlay Example

## Example I

[t]

```
1 | \only<1>{ First }\only<2>{ Second }\only<3>{ Third }
```

## Example II

[b] I am not here

```
1 | \alt<5>{ I am here }{ I am not here }
```

# More Complex Overlay Example

## Example I

[t]

```
1 | \only<1>{ First }\only<2>{ Second }\only<3>{ Third }
```

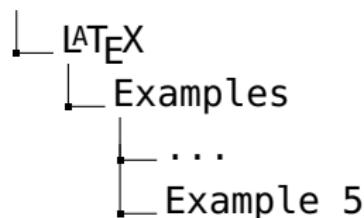
## Example II

[b] I am here

```
1 | \alt<5>{ I am here }{ I am not here }
```

# Try It Yourself: A Simple Presentation Using “Beamer”

- Open the following document either after downloading it to its own folder [▶ Link](#) or by accessing it in your training folders:



- Note the components we just discussed
  - The Beamer class
  - Slides / Frames and their options
  - Overlays

# Conclusion

- L<sup>A</sup>T<sub>E</sub>X is extremely powerful even though its wealth of functions may seem overwhelming upon first glance (i.e. now)
- Never stop Google-ing the problem you encounter – in 99.99% of the cases, somebody else has been troubled by the same issue
- Never stop looking at online material, e.g. the often referenced wikibook
- Steal from others! Copy! Love your plagiarism. It's just your document software – Not the academic content of your paper...
- Contact others – just send me an email if you need help

# Questions

# LATEX



If  $\lim_{x \rightarrow 8} \frac{1}{x-8} = \infty$  then  $\lim_{x \rightarrow 5} \frac{1}{x-5} = \text{?}$

# Resources

## Online Forum

- Meta-discussion of the  $\text{\TeX}$  -  $\text{\LaTeX}$  Q&A website  
<http://tex.stackexchange.com/>
  - Extremely active and responsive forum
  - Always check commands documentation first
  - Always provide minimal document to give an example of your problem

# Resources

## General Help I

- The Not So Short Introduction to  $\text{\LaTeX} 2_{\varepsilon}$   
<http://tobi.oetiker.ch/lshort/lshort.pdf>
- $\text{\LaTeX}$  for Word Processor Users  
<http://www.tex.ac.uk/tex-archive/info/latex4wp/latex4wp.pdf>
- Comprehensive TeX Archive Network  
<http://www.tex.ac.uk/>
- $\text{\LaTeX}$  Navigator  
<http://tex.loria.fr/english/>
- TeX Catalogue  
<http://www.ctan.org/>
- Wikibook  $\text{\LaTeX}$   
<http://en.wikibooks.org/wiki/LaTeX>

# Resources

## General Help II

- $\text{\LaTeX}$ Related Information

<http://theoval.cmp.uea.ac.uk/~nlct/latex/novices/novices.html>

- $\text{\LaTeX} 2\epsilon$ help 1.4

[http://www.emerson.emory.edu/services/latex/latex2e/latex2e\\_toc.html](http://www.emerson.emory.edu/services/latex/latex2e/latex2e_toc.html)

- Beginning  $\text{\LaTeX}$

<http://www.cs.cornell.edu/Info/Misc/LaTeX-Tutorial/LaTeX-Home.html>

- Norm Matloff's  $\text{\LaTeX}$ Tutorial Site

<http://heather.cs.ucdavis.edu/~matloff/latex.html>

- 5-Minute  $\text{\LaTeX}$ Tutorial

<http://heather.cs.ucdavis.edu/~matloff/LaTeX/FiveMinute.html>

# Resources

## Commands

- Collections of  $\text{\LaTeX}$  Command
  - $\text{\LaTeX}2e$  Cheat Sheet [RECOMMENDED]  
<http://www.stdout.org/~winston/latex/latexsheet.pdf>
  - $\text{\LaTeX}$  Command Summaries  
<http://www.ntg.nl/doc/biemedesderfer/ltxcrib.pdf>
  - $\text{\LaTeX}$  Command Glossary  
[http://en.wikibooks.org/wiki/LaTeX/Command\\_Glossary](http://en.wikibooks.org/wiki/LaTeX/Command_Glossary)
- The Comprehensive  $\text{\LaTeX}$  Symbol List  
<http://www.tex.ac.uk/tex-archive/info/symbols/comprehensive/symbols-a4.pdf>

# Resources

## Bibliographies

- JabRef  
<http://jabref.sourceforge.net/>
- BiBTEX  
<http://www.bibtex.org/>
- BiBTEX on wikipedia <http://en.wikipedia.org/wiki/Bibtex>
- Reference sheet for natbib usage <ftp://ftp.tex.ac.uk/tex-archive/macros/latex/contrib/natbib/natnotes.pdf>

# Resources

## Beamer Class

- Beamer User Guide  
<http://www.tex.ac.uk/tex-archive/macros/latex/contrib/beamer/doc/beameruserguide.pdf>
- Beamer Theme Matrix  
<http://www.hartwork.org/beamer-theme-matrix/>