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Introduction to LaTeX

Ricky Patterson

Big Library

21 Sep 2016

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Outline

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Introduction

- LaTeX is a document preparation system for high quality typesetting
- Not a Word Processor - Allows authors to focus on content rather than appearance.
- Frequently used in the preparation of scientific or technical documents, but can be used to create letters, dissertations, music scores, calendars, presentations, etc., etc., etc.

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LaTeX Features

- Typesetting articles, reports, books, presentations
- Typesetting complex formulas
- Control sectioning, cross-references, tables and figures
- Automatic generation of bibliographies, indexes, and TOCs
- Free, and Multi-platform (Win/Mac/Linux)
- Support: CTAN, TUG

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However...

- Steep learning curve
- Not WYSIWYG
- Can't easily convert to and from Word, etc.

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Basic Document

```
\documentclass{article}

\title{My First \LaTeX{}Document}

\author{Ricky Patterson}

\institute{UVa Library}

\date{September 2016}

\begin{document}

\maketitle

Hello world!

\end{document}
```

My First LaTeX Document

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LaTeX Document Preamble

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- At minimum, it must contain a `\documentclass[options]{document_type}` statement...

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  - `letter`: for writing letters
- Options
  - Font Size (`10pt,11pt,12pt`)
  - Paper Size (`letterpaper`), and Orientation (`landscape`)
  - Page Format (`twocolumn, oneside`)
  - and others...

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Packages

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- You can write your own packages (or more likely edit/tweak an existing package to alter the behavior in order to meet your needs). They are simply lines of LaTeX commands.

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- But it will produce a blank page

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Document

- Hello World document:

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\begin{docuemnt}

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- Double quotes are produced by typing two of the opening quote (‘) or closing quote (’)

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- The overall font size is set in preamble, but you can change font size temporarily: {\tiny tiny text} gives tiny text. Other sizes: scriptsize, footnotesize, small, normalsize, large, Large, LARGE, huge and Huge

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- \begin{description} also produces a list with each `\item[Point I] text` yields:
  Point I text

Tables and Figures

- Use `tabular` for basic tables — see Table 1, for example.
- To include a figure in your document, use the `includegraphics` command (see the comment below in the source code).

Item	Quantity
Widgets	42
Gadgets	13

Table 1: An example table.

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Readable Mathematics

Let $X_1, X_2, \ldots, X_n$ be a sequence of independent and identically distributed random variables with $\mathrm{E}[X_i] = \mu$ and $\mathrm{Var}[X_i] = \sigma^2 < \infty$, and let

$$S_n = \frac{X_1 + X_2 + \cdots + X_n}{n} = \frac{1}{n}\sum_{i}^{n} X_i$$

denote their mean. Then as n approaches infinity, the random variables $\sqrt{n}(S_n - \mu)$ converge in distribution to a normal $\mathcal{N}(0, \sigma^2)$.

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Installing and Using

- There are several browser/cloud-based solutions. Overleaf, ShareLaTeX and Authorea all provide **collaborative** editing capabilities and LaTeX package and template support. There are free and paid versions of each.
- You can also install LaTeX locally. TeXLive (MacTeX on Macs) is one good (and free) choice. It can be configured to check for package updates at CTAN automatically.
- When you try to write valid LaTeX you'll want an editor that has a LaTeX mode. TeXShop (part of TeXLive) is one, TeXStudio is another. Emacs and VIM have good support.

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References

- CTAN (Comprehensive TeX Archive Network): ctan.org
- TUG (TeX Users Group): tug.org
- The LaTeX Companion (Mittelbach and Goossens, 2004)
- A Guide to LaTeX: Document Preparation for Beginners and Advanced Users (Kopka and Daly, 1999)
- The Not So Short Intro to LaTeX (Oetiker, updated July 2015 → lshort.pdf)
- This presentation (code and PDF): https://www.overleaf.com/read/mctrvxzfdtvh
- Materials from previous LaTeX workshops: http://data.library.virginia.edu/statlab/past-workshops/
- Overleaf.com Templates and Intro Guides.