An Interactive Introduction to \LaTeX
Part 3: Not Just Papers: Presentations & More

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You write your document in plain text with **commands** that describe its structure and meaning.

The \texttt{latex} program processes your text and commands to produce a beautifully formatted document.

\begin{verbatim}
The rain in Spain falls \texttt{\textit{mainly}} on the plain.
\end{verbatim}

The rain in Spain falls \emph{mainly} on the plain.
\LaTeX\ Recap: Commands & Arguments

- A command starts with a \textit{backslash} $\backslash$.
- Some commands take an \textit{argument} in curly braces $\{\}$.
- Some commands also take \textit{optional arguments} in square brackets $[\]$.

\begin{Verbatim}
\includegraphics[width=0.5\textwidth]{gerbil}
\end{Verbatim}

\begin{Verbatim}
\includegraphics[width=0.3\textwidth, angle=270]{gerbil}
\end{Verbatim}

Image license: CC0
\LaTeX\ Recap: Environments

▶ The \texttt{\begin} and \texttt{\end} commands are used to create many different environments — contexts.

▶ The \texttt{itemize} and \texttt{enumerate} environments make lists.

\begin{itemize}
\item Biscuits
\item Tea
\end{itemize}

\begin{enumerate}
\item Biscuits
\item Tea
\end{enumerate}
\textbf{\LaTeX} Recap: Mathematics

- The equation environment makes a numbered equation.

\begin{equation}
\sum_{k=1}^{n} \frac{1}{2^k}
\end{equation}

- Use dollar signs $\$\$ to mark mathematics in text.

\begin{tabular}{|l|}
\hline
\% not so good: Let $a$ and $b$ be distinct positive integers, and let $c = a - b + 1$. \\
\% much better: Let $a$ and $b$ be distinct positive integers, and let $c = a - b + 1$. \\
\hline
\end{tabular}

- Always use dollar signs in pairs — one to begin the mathematics, and one to end it.

In fact, we could have written $\ldots$ as \begin{math}\ldots\end{math}. 
\LaTeX Recap: Document Structure

- Starts with the \texttt{\documentclass} — what type of document.
- Metadata (\texttt{\title} and \texttt{\author}) and packages in the preamble.
- Content between \texttt{\begin{document}} and \texttt{\end{document}}.
- The \texttt{\maketitle} command creates the title; \texttt{\section} commands create numbered sections.

\begin{verbatim}
\documentclass{article}
% preamble
\title{The Title}
\author{A. Author}

\begin{document}
% body
\maketitle

\section{Introduction}
In this paper we \ldots

\end{document}
\end{verbatim}
\LaTeX\ Recap: Exercise

1. Here is the text for a short article:\(^1\)

   Click to open this exercise in Overleaf

2. Add \LaTeX\ commands to the text to make it look like this one:

   Click to open the model document

Hints

▶ Use the enumerate and itemize environments for lists.
▶ To typeset a \(\%\) percent sign, escape it with a backslash (\%).
▶ To typeset the equation, use \texttt{\textbackslash frac} for the fraction and the \texttt{\textbackslash left(} and \texttt{\textbackslash right)} commands for the parentheses.

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\(^1\)Based on \url{http://www.cgd.ucar.edu/cms/agu/scientific_talk.html}
Presentations with beamer

- Beamer is a package for creating presentations (such as this one!) in \LaTeX.
- It provides the \texttt{beamer} document class.
- Use the \texttt{frame} environment to create slides.

\begin{verbatim}
\documentclass{beamer}
\title{Welcome to Beamer}
\author{You}
\institute{Where You're From}
\date{Date of Presentation}
\begin{document}
\begin{frame}
\titlepage % beamer's \maketitle
\end{frame}
\end{document}
\end{verbatim}

Welcome to Beamer
You
Where You're From
Date of Presentation
Presentations with beamer: Following Along

- As we go through the following slides, try out the examples by typing them into the example document on Overleaf.

Click to open the example document in Overleaf
Presentations with beamer: Frames

- Use \frametitle to give the frame a title.
- Then add content to the frame.
- The source for this frame looks like:

\begin{frame}
  \frametitle{Presentations with beamer: Frames}
  \begin{itemize}
  \item Use \texttt{frametitle} to give the frame a title.
  \item Then add content to the frame.
  \item The source for this frame looks like ...
  \end{itemize}
\end{frame}
Presentations with beamer: Sections

▶ You can use \section{s} to group your frames, and beamer will use them to create an automatic outline.

▶ To generate an outline, use the \tableofcontents command. Here’s one for this presentation. The currentsection option highlights the current section.

\tableofcontents[currentsection]
Presentations with beamer: Multiple Columns

- Use the columns and column environments to break the slide into columns.
- The argument for each column determines its width.
- See also the multicol package, which automatically breaks your content into columns.

\begin{columns}
  \begin{column}{0.4\textwidth}
    \begin{itemize}
      \item Use the columns ...
      \item The argument ...
      \item See also the ...
    \end{itemize}
  \end{column}
  \begin{column}{0.6\textwidth}
    \begin{itemize}
      \item \textit{second column}
    \end{itemize}
  \end{column}
\end{columns}
Presentations with beamer: Highlights

- Use \textit{\textbf{emph}} or \textit{\textbf{alert}} to highlight:

  | I should \textit{\textbf{emphasise}} that this is an \textit{\textbf{important}} point. | I should \textit{\textbf{emphasise}} that this is an important point. |

- Or specify bold face or italics:

  | Text in \textit{\textbf{bold face}}. Text in \textit{\textbf{italics}}. | Text in \textbf{bold face}. Text in \textit{italics}. |

- Or specify a color (American spelling):

  | It \textit{\textbf{textcolor{red}{stops}}} and \textit{\textbf{textcolor{green}{starts}}}. | It stops and starts. |

Presentations with beamer: Figures

- Use \texttt{\includegraphics} from the graphicx package.
- The figure environment centers by default, in beamer.

\begin{figure}
\includegraphics[width=0.5\textwidth]{gerbil}
\end{figure}

Image license: CC0
Presentations with \texttt{beamer}: Tables

- Tables in \LaTeX take some getting used to.
- Use the \texttt{tabular} environment from the \texttt{tabularx} package.
- The argument specifies column alignment — \texttt{left, right, right}.

\begin{tabular}{lrr}
  Item & Qty & Unit \\
  Widget & 1 & 199.99 \\
  Gadget & 2 & 399.99 \\
  Cable & 3 & 19.99 \\
\end{tabular}

- It also specifies vertical lines; use \texttt{\hline} for horizontal lines.

\begin{tabular}{|l|l|l|}
  \hline
  Item & Qty & Unit \\
  \hline
  Widget & 1 & 199.99 \\
  Gadget & 2 & 399.99 \\
  Cable & 3 & 19.99 \\
  \hline
\end{tabular}

- Use an ampersand \texttt{\&} to separate columns and a double backslash \texttt{\\} to start a new row.
A block environment makes a titled box.

\begin{block}{Interesting Fact}
This is important.
\end{block}

\begin{alertblock}{Cautionary Tale}
This is really important!
\end{alertblock}

How exactly they look depends on the theme...
Presentations with beamer: Themes

- Customise the look of your presentation using themes.

```
\documentclass{beamer}
\selectlanguage{en}% or Warsaw, Bergen, Madrid, ...
\usetheme{Darmstadt}
\selectlanguage{en}% or albatross, beaver, crane, ...
\usecolortheme{beetle}
\title{Theme Demo}
\author{John}
\begin{document}
\begin{frame}
\titlepage
\end{frame}
\end{document}
```
Presentations with \texttt{beamer}: Animation

- A frame can generate multiple slides.
- Use the \texttt{\pause} command to show only part of a slide.

\begin{itemize}
\item Can you feel the \texttt{\pause} \item anticipation?
\end{itemize}

- Can you feel the
Presentations with \texttt{beamer}: Animation

- A frame can generate multiple slides.
- Use the \texttt{\pause} command to show only part of a slide.

\begin{itemize}
\item Can you feel the \texttt{\pause \item} anticipation?
\end{itemize}

- There many more clever ways of making animations in \texttt{beamer}; see also the \texttt{\only}, \texttt{\alt}, and \texttt{\uncover} commands.
Presentations with beamer: Exercise

Recreate Peter Norvig’s excellent “Gettysburg Powerpoint Presentation” in beamer.²

1. Open this exercise in Overleaf:
   
   Click to open this exercise in Overleaf

2. Download this image to your computer and upload it to Overleaf via the files menu.
   
   Click to download image

3. Add \LaTeX\ commands to the text to make it look like this one:
   
   Click to open the model document

²http://norvig.com/Gettysburg
Drawings with TikZ

- TikZ is a package for drawing figures in \LaTeX.
- It defines a powerful drawing language inside \LaTeX. Short programs can draw surprisingly complicated things.

We’ll start with simple things. To draw a line in TikZ:

\begin{tikzpicture}
\draw (0,0) -- (1,1); % a line
\end{tikzpicture}
Drawings with TikZ: Coordinates

- The default coordinates are centimeters, with the usual sense:

  \begin{align*}
  & (0, 3) & (3, 3) \\
  & \begin{array}{|c|c|c|c|c|c|}
  \hline
  & & & & & \\
  \hline
  & & & & & \\
  \hline
  & & & & & \\
  \hline
  \end{array} \\
  & (0, 0) & (3, 0) \\
  \end{align*}

- It helps to draw a grid when you are working with TikZ:

\begin{tikzpicture}
\draw[help lines] (0,0) grid (3,3);
\end{tikzpicture}
Drawings with TikZ: Lines

- Arrow heads and line styles are specified as options to the `\draw` command.
- End each draw command with a `;` semicolon.

```latex
\begin{tikzpicture}
\draw[help lines] (0,0) grid (3,3);
\draw[->] (0,0) -- (1,1);
\draw[<->, thick] (2,1) -- (1,2);
\draw[<-, thick, dashed] (2,2)--(3,3);
\end{tikzpicture}
```
Drawings with TikZ: Paths

- You can specify multiple points to form a path.
- Arrows will appear only at the ends of the path.

\begin{tikzpicture}
\draw[help lines] (0,0) grid (3,3);
\draw[<->, thick] (0,3)--(0,0)--(3,0);
\draw (1.5,0.5) -- (2.5,1.5) -- (1.5,2.5) -- (0.5,1.5) -- cycle;
\end{tikzpicture}
Drawings with TikZ: Colours

Colours are also specified as options to \texttt{\draw}.

\begin{tikzpicture}
\draw[help lines] (0,0) grid (3,3);
% axes
\draw[<->, thick, red] (0,3)--(0,0)--(3,0);
% diamond
\draw[thick, blue, fill=yellow] (1.5,0.5) -- (2.5,1.5) -- (1.5,2.5) -- (0.5,1.5) -- cycle;
\end{tikzpicture}
TikZ has built-in commands for simple shapes.

\begin{tikzpicture}
\draw[help lines] (0,0) grid (3,3);
\draw (1.5,2.0) circle (0.5);
\draw (0.5,0.5) rectangle (2.5,1.5);
\end{tikzpicture}
Drawings with TikZ: Nodes & Labels

- Use nodes to place text (and math) in TikZ drawings.
- You can also use nodes as coordinates — useful for diagrams.

```latex
\begin{tikzpicture}
\draw[help lines] (0,0) grid (3,3);
\node (h) at (0,0) {H};
\node (x) at (1.5,1.5) {$\xi$};
\node (t) at (3,0) {T};
\draw[-] (x) -- (h);
\draw[-] (x) -- (t);
\end{tikzpicture}
```
Drawings with TikZ: Functions

- You can even plot some simple functions.

\begin{tikzpicture}[scale=0.5]
\draw[<->, thick] (0,2) -- (0,-2);
\draw[<->, thick] (0,2) -- (0,-2);
\draw[->, thick] (0,0) -- (7, 0);
\draw[cyan, domain=0:2*pi] plot (\x, {sin(\x r)});
\draw[magenta, domain=0:2*pi] plot (\x, {cos(\x r)});
\end{tikzpicture}
Drawings with TikZ: Examples

▶ Check out TeXample.net for many TikZ examples:
Drawings with \textit{TikZ: Exercise}

Draw this in \textit{TikZ}:\footnote{Based on \url{http://xkcd.com/1022}}

So it has come to this.
Notes with todonotes

- The `\todo` command from the todonotes package is great for leaving notes to yourself and your collaborators.

\begin{itemize}
  \item \texttt{\todo{add results}}
  \texttt{\todo[color=blue!20]{fix method}}
\end{itemize}

- Pro Tip: define your own commands with `\newcommand`

\begin{itemize}
  \item `\newcommand{\alice}[1]{\todo[color=green!40]{#1}}`
  \item `\newcommand{\bob}[1]{\todo[color=purple!40]{#1}}`
\end{itemize}

This can save a lot of typing:

\begin{itemize}
  \item `\alice{add results}`
  \item `\bob{fix method}`
\end{itemize}
Notes with todonotes

- Only inline notes are supported with beamer, but margin notes are supported for normal documents.
- There is also a handy \listoftodos command.
Spreadsheets with spreadtab

- Now that you’ve seen how \LaTeX{} can replace Word and PowerPoint, what about Excel?
- Homework: try the \texttt{spreadtab package}!
Thanks, and happy TeXing!