

# Math 2794W An Interactive Introduction to $\text{\LaTeX}$

## Part 3: Not Just Papers: Presentations & More

Original slides written by Dr John D. Lees-Miller (modified with permission)

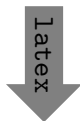
February 24, 2020



# L<sup>A</sup>T<sub>E</sub>X Recap

- ▶ You write your document in plain text with `commands` that describe its structure and meaning.
- ▶ The `latex` program processes your text and commands to produce a beautifully formatted document.

The rain in Spain falls `\emph{mainly}` on the plain.



The rain in Spain falls *mainly* on the plain.

# L<sup>A</sup>T<sub>E</sub>X Recap: Commands & Arguments

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

```
\includegraphics[  
  width=0.5\textwidth]{gerbil}
```

```
\includegraphics[  
  width=0.3\textwidth,  
  angle=270]{gerbil}
```



# L<sup>A</sup>T<sub>E</sub>X Recap: Environments

- ▶ The `\begin` and `\end` commands are used to create many different environments — contexts.
- ▶ The `itemize` and `enumerate` environments make lists.

```
\begin{itemize} % for bullet points
\item Biscuits
\item Tea
\end{itemize}
```

```
\begin{enumerate} % for numbers
\item Biscuits
\item Tea
\end{enumerate}
```

▶ Biscuits

▶ Tea

1. Biscuits

2. Tea

# L<sup>A</sup>T<sub>E</sub>X Recap: Mathematics

- ▶ The equation environment makes a numbered equation.

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

$$\sum_{k=1}^n \frac{1}{2^k} \quad (1)$$

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

*% 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 `$c = a - b + 1$`.

Let *a* and *b* be distinct positive integers, and let *c* = *a* - *b* + 1.

Let *a* and *b* be distinct positive integers, and let *c* = *a* - *b* + 1.

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

In fact, we could have written `$...$` as `\begin{math}...\end{math}`.

# L<sup>A</sup>T<sub>E</sub>X Recap: Document Structure

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

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

\begin{document}
% body
\maketitle

\section{Introduction}

In this paper we \ldots

\end{document}
```

The Title

A. Author

January 21, 2020

## 1 Introduction

...

# L<sup>A</sup>T<sub>E</sub>X Recap: Exercise

1. Here is the text for a short article:<sup>1</sup>

Click to open this exercise in **Overleaf**

2. Add L<sup>A</sup>T<sub>E</sub>X 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 `\frac` for the fraction and the `\left(` and `\right)` commands for the parentheses.

---

<sup>1</sup>Based on [http://www.cgd.ucar.edu/cms/agu/scientific\\_talk.html](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  $\text{\LaTeX}$ .
- ▶ It provides the beamer document class.
- ▶ Use the frame environment to create slides.

```
\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}
```

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 `\sections` 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]
```

LaTeX Recap

Presentations with beamer

Drawings with TikZ

Notes with todonotes

Spreadsheets with  
spreadtab

# 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}
    % second column
  \end{column}
\end{columns}
```

# Presentations with beamer: Highlights

- Use `\emph` or `\alert` to highlight:

I should <code>\emph{emphasise}</code> that this is an <code>\alert{important}</code> point.	I should <i>emphasise</i> that this is an <b>important</b> point.
---	--

- Or specify bold face or italics:

Text in <code>\textbf{bold face}</code> . Text in <code>\textit{italics}</code> .	Text in <b>bold face</b> . Text in <i>italics</i> .
--	--

- Or specify a color (American spelling):

It <code>\textcolor{red}{stops}</code> and <code>\textcolor{green}{starts}</code> .	It <b>stops</b> and <b>starts</b> .
--	-------------------------------------

- See <http://www.math.umbc.edu/~rouben/beamer/quickstart-Z-H-25.html> for more colors & custom colors.

# Presentations with beamer: Figures

- ▶ Use `\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 beamer: Tables

- ▶ Tables in  $\text{\LaTeX}$  take some getting used to.
- ▶ Use the `tabular` environment from the `tabularx` package.
- ▶ The argument specifies column alignment — **l**eft, **r**ight, **c**enter.

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

Item	Qty	Unit \$
Widget	1	199.99
Gadget	2	399.99
Cable	3	19.99

- ▶ It also specifies vertical lines; use `\hline` for horizontal lines.

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

Item	Qty	Unit \$
Widget	1	199.99
Gadget	2	399.99
Cable	3	19.99

- ▶ Use an ampersand `&` to separate columns and a double backslash `\\` to start a new row.

# Presentations with beamer: Blocks

- ▶ A block environment makes a titled box.

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

## Interesting Fact

This is important.

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

## Cautionary Tale

This is really important!

- ▶ How exactly they look depends on the theme. . .



# Presentations with beamer: Themes

- ▶ Customise the look of your presentation using themes.
- ▶ See [http://deic.uab.es/~iblanes/beamer\\_gallery/index\\_by\\_theme.html](http://deic.uab.es/~iblanes/beamer_gallery/index_by_theme.html) for a large collection of themes.

```
\documentclass{beamer}

% or Warsaw, Bergen, Madrid, ...
\usetheme{Darmstadt}

% or albatross, beaver, crane, ...
\usecolortheme{beetle}

\title{Theme Demo}
\author{John}
\begin{document}
\begin{frame}
\titlepage
\end{frame}
\end{document}
```



# Presentations with beamer: Animation

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

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

- ▶ Can you feel the

# Presentations with beamer: Animation

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

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

- ▶ Can you feel the
- ▶ anticipation?

- ▶ There many more clever ways of making animations in beamer; see also the `\only`, `\alt`, and `\uncover` commands.

# Presentations with beamer: Exercise

Recreate Peter Norvig's excellent "Gettysburg Powerpoint Presentation" in beamer.<sup>2</sup>

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  $\text{\LaTeX}$  commands to the text to make it look like this one:

Click to open the model document

---

<sup>2</sup><http://norvig.com/Gettysburg>

# (For students comfortable with $\text{\LaTeX}$ ) Drawings with TikZ

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



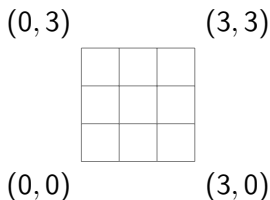
- ▶ We'll start with simple things. To draw a line in TikZ:

```
\begin{tikzpicture}  
\draw (0,0) -- (1,1); % a line  
\end{tikzpicture}
```



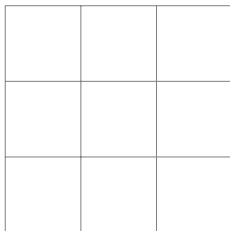
# (For students comfortable with $\text{\LaTeX}$ ) Drawings with TikZ: Coordinates

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



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

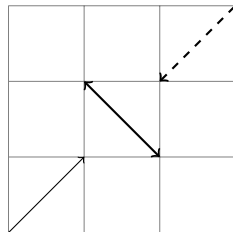
```
\begin{tikzpicture}  
  \draw[help lines] (0,0) grid (3,3);  
\end{tikzpicture}
```



# (For students comfortable with $\text{\LaTeX}$ ) Drawings with TikZ: Lines

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

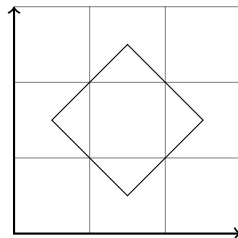
```
\begin{tikzpicture}  
\draw[help lines] (0,0) grid (3,3);  
\draw[->] (0,0) -- (1,1);  
\draw[<->, thick] (2,1) -- (1,2);  
\draw[<-, thick, dashed] (2,2)--(3,3);  
\end{tikzpicture}
```



# (For students comfortable with $\text{\LaTeX}$ ) 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);
% axes:
\draw[<->, thick] (0,3)--(0,0)--(3,0);
% diamond:
\draw (1.5,0.5) -- (2.5,1.5) --
      (1.5,2.5) -- (0.5,1.5) --
      cycle; % close the path
\end{tikzpicture}
```

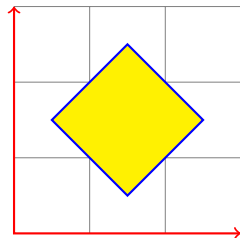




# (For students comfortable with $\text{\LaTeX}$ ) Drawings with TikZ: Colours

- Colours are also specified as options to `\draw`.

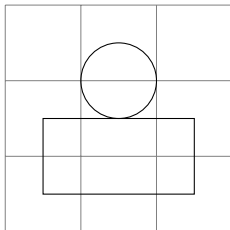
```
\begin{tikzpicture}
\draw[help lines] (0,0) grid (3,3);
% axes
\draw[<->, thick, red]
  (0,3)--(0,0)--(3,0);
% diamond
\draw[thick, blue, fill=yellow]
  (1.5,0.5) -- (2.5,1.5) --
  (1.5,2.5) -- (0.5,1.5) --
  cycle;
\end{tikzpicture}
```



# (For students comfortable with $\text{\LaTeX}$ ) Drawings with TikZ: Shapes

- TikZ has built-in commands for simple shapes.

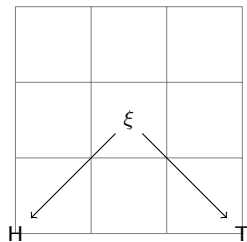
```
\begin{tikzpicture}  
  \draw[help lines] (0,0) grid (3,3);  
  \draw (1.5,2.0) circle (0.5);  
  \draw (0.5,0.5) rectangle (2.5,1.5);  
\end{tikzpicture}
```



# (For students comfortable with $\text{\LaTeX}$ ) 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.

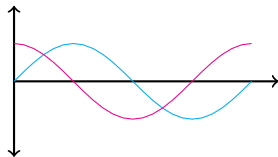
```
\begin{tikzpicture}
\draw[help lines] (0,0) grid (3,3);
\node (h) at (0,0) {H};
\node (x) at (1.5,1.5) { $\xi$ };
\node (t) at (3,0) {T};
\draw[->] (x) -- (h);
\draw[->] (x) -- (t);
\end{tikzpicture}
```



# (For students comfortable with $\text{\LaTeX}$ ) Drawings with TikZ: Functions

- You can even plot some simple functions.

```
\begin{tikzpicture}[scale=0.5]
% y axis
\draw[<->, thick] (0,2) -- (0,-2);
% x axis
\draw[ ->, thick] (0,0) -- (7, 0);
% curves
\draw[cyan,domain=0:2*pi]
  plot (\x, {\sin(\x r)});
\draw[magenta,domain=0:2*pi]
  plot (\x, {\cos(\x r)});
\end{tikzpicture}
```



# (For students comfortable with $\text{\LaTeX}$ ) Drawings with TikZ: Examples

- Check out [T<sub>E</sub>Xample.net](https://www.texample.net) for many TikZ examples:

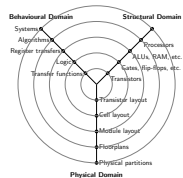
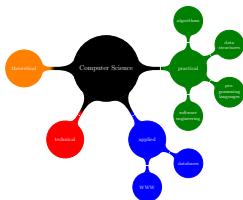
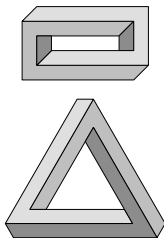
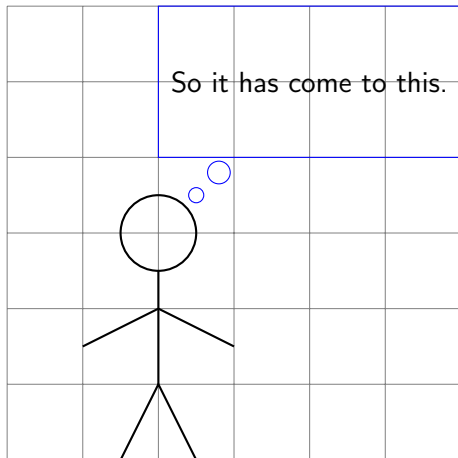


Figure 1: Gajski-Kuhni Y-chart

# (For students comfortable with $\text{\LaTeX}$ ) Drawings with TikZ: Exercise

Draw this in TikZ:<sup>3</sup>



---

<sup>3</sup>Based on <http://xkcd.com/1022>

# Notes with todonotes

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

```
\todo{add results}  
\todo[color=blue!20]{fix method}
```

add results

fix method

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

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

This can save a lot of typing:

```
\alice{add results}  
\bob{fix method}
```

add results

fix method

# 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.

## Towards the Confusing Unification of Rasterization and Local-Area Networks in State Machines

Alice Bob, Carol David, Edward Fredrick

### Todo list

Are they polynomial time?	1
Realize multicast access points?	1
Instead of controlling the forward-error correction?	1
Phasellus libero ipsum, pellentesque sit amet, sem.	1

### Abstract

Rasterization and Smalltalk, while important in theory, have not until recently been considered important. Given the current status of wearable methodologies, analysts clearly desire the refinement of IPv4. Purr, our new heuristic for the producer-consumer problem [1], is the solution to all of these problems.

### 1 Introduction

Recent advances in certifiable symmetries and Bayesian technology synchro-nize in order to realize access points. This is a direct result of the construction of multicast algorithms. This is a direct result of the analysis of active networks. The emulation of suffix trees would profoundly improve congestion control [4].

To our knowledge, our work in our research marks the first method analyzed specifically for scalable models. Existing interactive and permutable methodologies use Smalltalk to measure the construction of the partition table. The disadvantage of this type of method, however, is that hash tables can be made real-time, cooperative, and reliable. Existing “fuzzy” and concurrent algorithms use the evaluation of multicast frameworks to request access points. On the other hand, distributed archetypes might not be the

Are they polynomial time?

Realize multicast access points?

Instead of controlling the forward-error correction?

Phasellus libero ipsum, pellentesque sit amet, sem.



## Spreadsheets with spreadtab

- ▶ Now that you've seen how  $\text{\LaTeX}$  can replace Word and PowerPoint, what about Excel?
- ▶ Homework: try the `spreadtab` package!

Thanks, and happy T<sub>E</sub>Xing!