An Interactive Introduction to LaTeX

Part 3: Not Just Papers: Presentations & More

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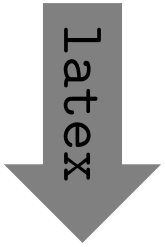
LaTeX Recap

- 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.

LaTeX 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}
```

Image license: CC0

LaTeX 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

LaTeX Recap: Mathematics

- The `equation` environment makes a numbered equation.

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

$$\sum_{k=1}^{n} \frac{1}{2^k} \tag{1}$$

- 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}`.

LaTeX 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.

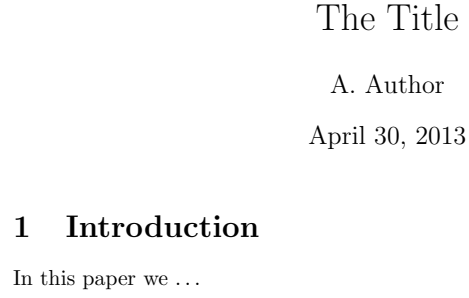
```
\documentclass{article}
% preamble
\title{The Title}
\author{A. Author}

\begin{document}
% body
\maketitle

\section{Introduction}

In this paper we \ldots

\end{document}
```



The Title

A. Author

April 30, 2013

1 Introduction

In this paper we . . .

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 `\frac` for the fraction and the `\left(` and `\right)` commands for the parentheses.

[1] Based on `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 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}
```

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 \emph{emphasise} that
this is an \alert{important} point.
```

I should *emphasise* that this is an important point.

- Or specify bold face or italics:

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

Text in **bold face**. Text in *italics*.

- Or specify a color (American spelling):

```
It \textcolor{red}{stops}
and \textcolor{green}{starts}.
```

It stops and starts.

- 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 LaTeX take some getting used to.
- Use the `tabular` environment from the `tabularx` package.
- The argument specifies column alignment — **l**eft, **r**ight, **r**ight.

```
\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|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}

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

Interesting Fact

This is important.

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` 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.[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

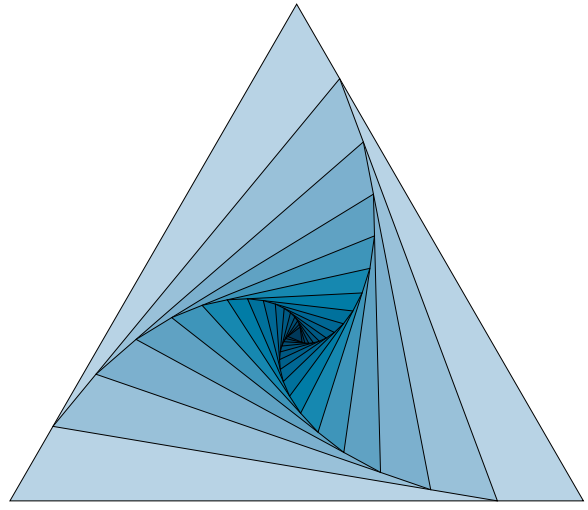
3. Add LaTeX commands to the text to make it look like this one:

   Click to open the model document

[2] http://norvig.com/Gettysburg

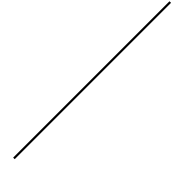
Drawings with Ti*k*Z

- Ti*k*Z is a package for drawing figures in LaTeX.
- It defines a powerful drawing language inside LaTeX. Short programs can draw surprisingly complicated things.



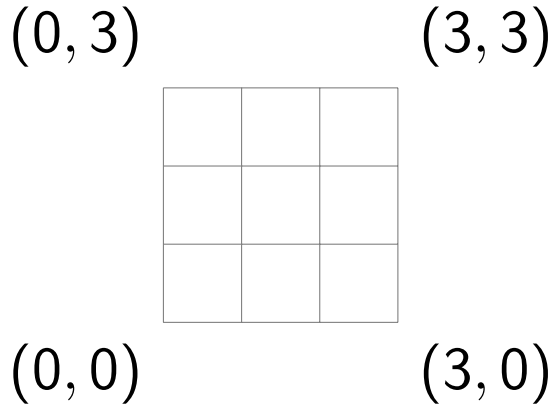
- We'll start with simple things. To draw a line in Ti*k*Z:

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



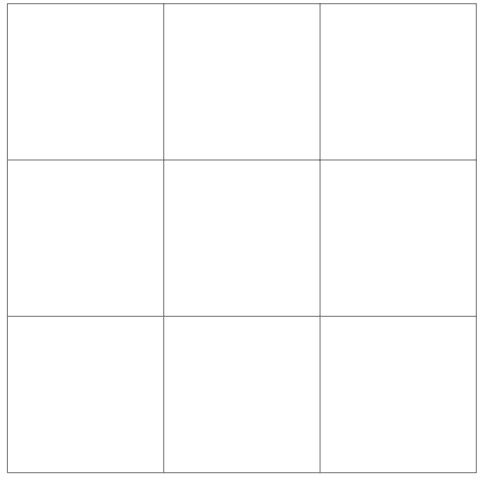
Drawings with Ti*k*Z: Coordinates

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



- It helps to draw a grid when you are working with Ti*k*Z:

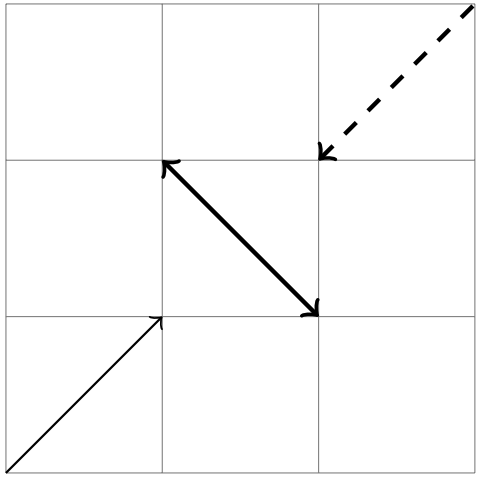
```
\begin{tikzpicture}
\draw[help lines] (0,0) grid (3,3);
\end{tikzpicture}
```



Drawings with TikZ: Lines

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

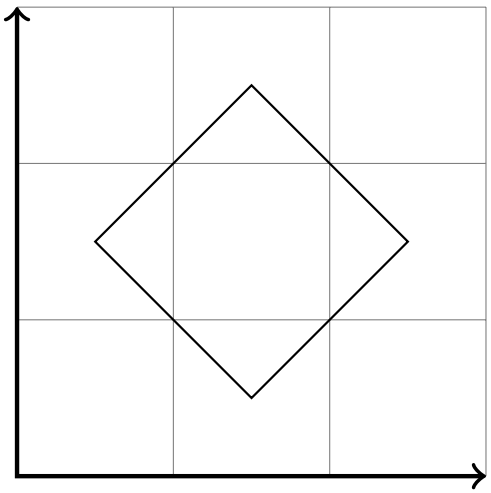
```
\begin{tikzpicture}
\draw[help lines] (0,0) grid (3,3);
\draw[->] (0,0) -- (1,1);
\draw[<->, thick] (2,1) -- (1,2);
\draw[<-, thick, dashed] (2,2)--(3,3);
\end{tikzpicture}
```



Drawings with TikZ: Paths

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

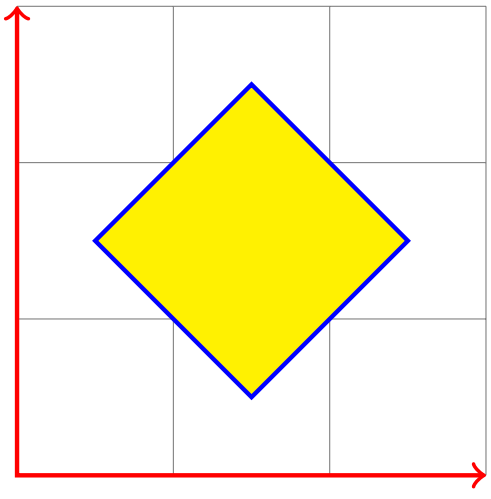
```
\begin{tikzpicture}
\draw[help lines] (0,0) grid (3,3);
% axes:
\draw[<->, thick] (0,3)--(0,0)--(3,0);
% diamond:
\draw (1.5,0.5) -- (2.5,1.5) --
      (1.5,2.5) -- (0.5,1.5) --
      cycle; % close the path
\end{tikzpicture}
```



Drawings with TikZ: Colours

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

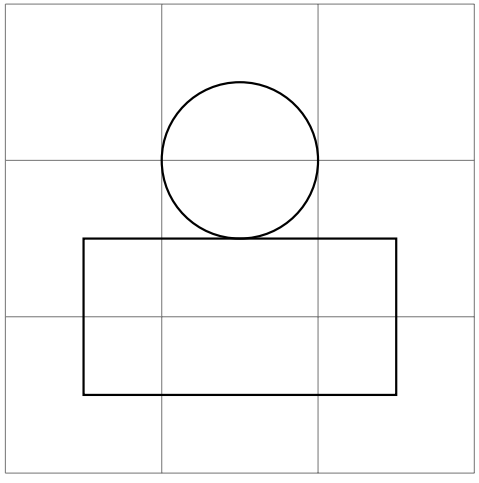
```
\begin{tikzpicture}
\draw[help lines] (0,0) grid (3,3);
% axes
\draw[<->, thick, red]
  (0,3)--(0,0)--(3,0);
% diamond
\draw[thick, blue, fill=yellow]
  (1.5,0.5) -- (2.5,1.5) --
  (1.5,2.5) -- (0.5,1.5) --
  cycle;
\end{tikzpicture}
```



Drawings with Ti*k*Z: Shapes

- Ti*k*Z has built-in commands for simple shapes.

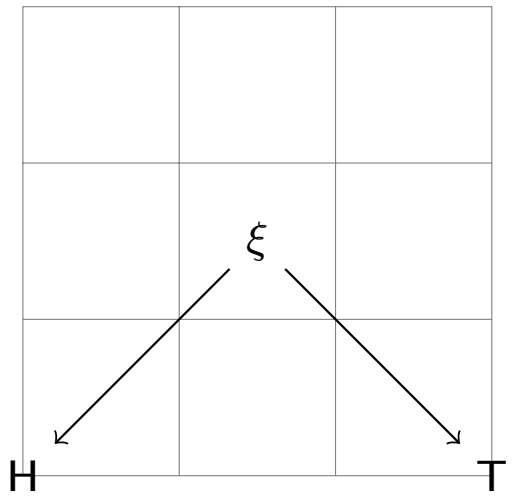
```
\begin{tikzpicture}
\draw[help lines] (0,0) grid (3,3);
\draw (1.5,2.0) circle (0.5);
\draw (0.5,0.5) rectangle (2.5,1.5);
\end{tikzpicture}
```



Drawings with Ti*k*Z: Nodes & Labels

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

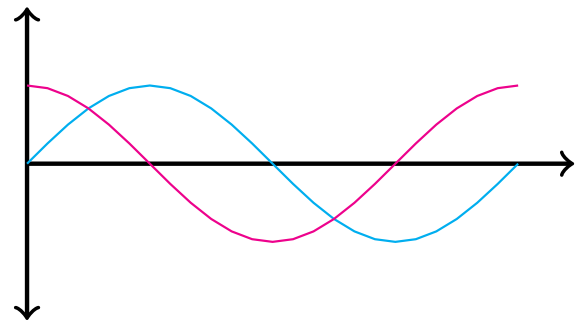
```
\begin{tikzpicture}
\draw[help lines] (0,0) grid (3,3);
\node (h) at (0,0) {H};
\node (x) at (1.5,1.5) {$\xi$};
\node (t) at (3,0) {T};
\draw[->] (x) -- (h);
\draw[->] (x) -- (t);
\end{tikzpicture}
```



Drawings with TikZ: Functions

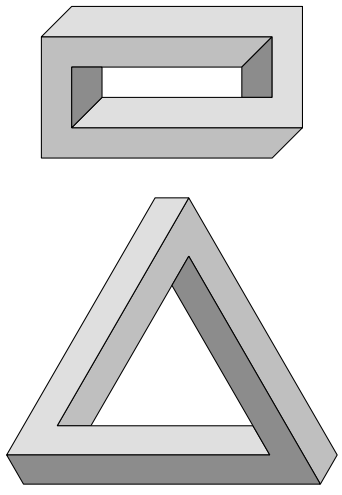
- You can even plot some simple functions.

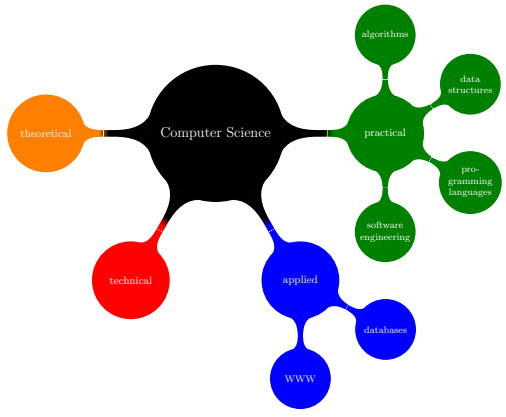
```
\begin{tikzpicture}[scale=0.5]
% y axis
\draw[<->, thick] (0,2) -- (0,-2);
% x axis
\draw[ ->, thick] (0,0) -- (7, 0);
% curves
\draw[cyan,domain=0:2*pi]
  plot (\x, {sin(\x r)});
\draw[magenta,domain=0:2*pi]
  plot (\x, {cos(\x r)});
\end{tikzpicture}
```



Drawings with Ti*k*Z: Examples

- Check out TEXample.net for many Ti*k*Z examples:





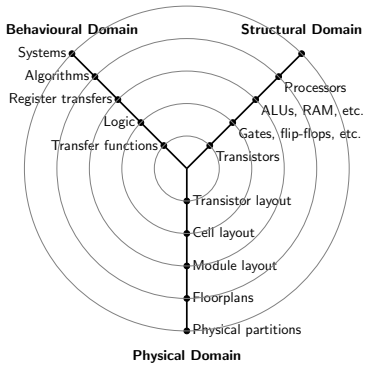
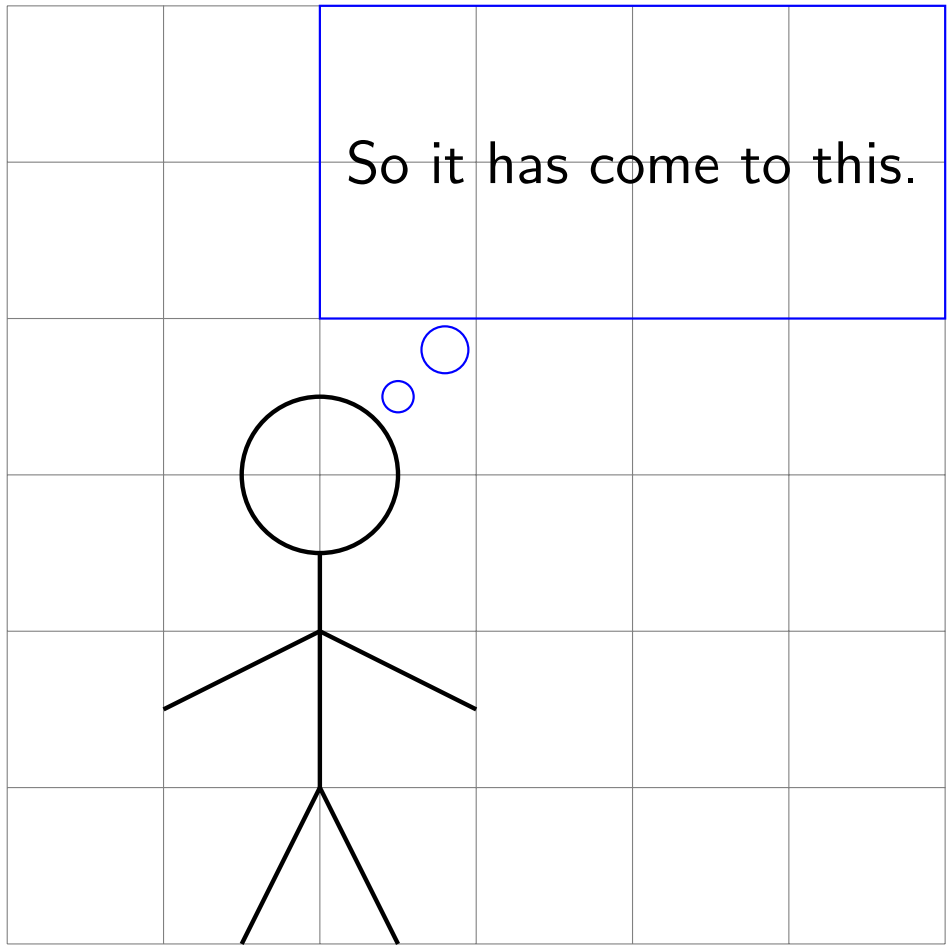


Figure 1: Gajski-Kuhn Y-chart

Drawings with Ti*k*Z: Exercise

Draw this in Ti*k*Z:[3]

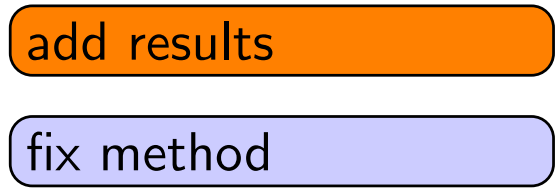


[3] Based on `http://xkcd.com/1022`

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}
```

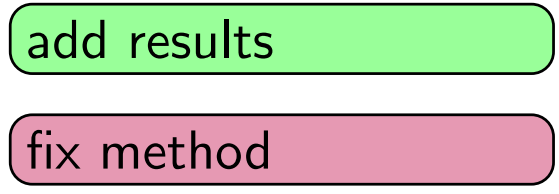


- Pro Tip: define your own commands with \newcommand

```
\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}
```



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.

Are they polynomial time?

Realize multicast access points?

1 Introduction

Recent advances in certifiable symmetries and Bayesian technology synchronize 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].

Instead of controlling the forward-error correction?

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

Phasellus libero ipsum, pellentesque sit amet, sem.

Spreadsheets with `spreadtab`

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

Thanks, and happy TEXing!