Introduction to LaTeX

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Who am I?

What can you do with LaTeX?

What can you do with LaTeX?

- Scholarly articles
- Books and book chapters
- (bibliography support through BibTeX)
- Presentations (like this one!)
- Resumes/CVs

What is the difference between *word processing* and *typesetting*?

Why choose typesetting over (most) word processing?

- The source is *portable* and *versionable*. Anything that can edit text can edit LaTeX.
- It is *way* easier to do things like inline formulas ($E = mc^2$), images, and tables.
- Easy to generate indices, bibliographies, cross references
- It allows you to *write* without worrying what the writing *looks like*.
- LaTeX can produce some *beautiful* output. Even the stock PDF output is pleasant!
- The documentation for LaTeX is **vast** (and beautiful, of course) and there's a StackExchange answer for just about anything you'd think to ask.
- You can generate many document types – PDFs, ePubs, Markdown, HTML, yes, even Word format – from LaTeX source.

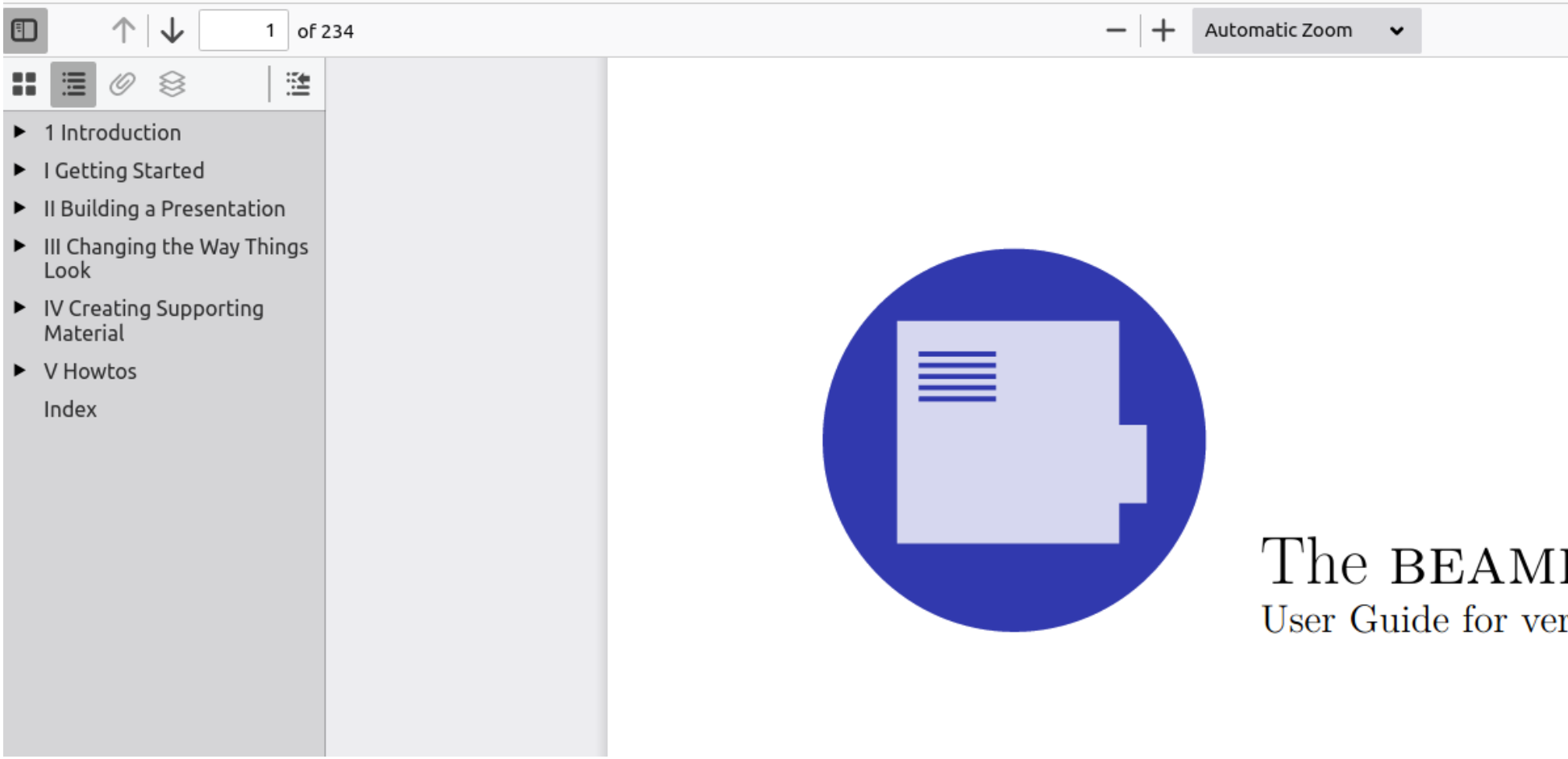
And perhaps most importantly...

Most STEM specific journals can accept submissions in LaTeX, and some will **only** accept submissions in LaTeX.

Worry about **content**, not (or not as much) about **form**.

Why choose word processing *over* typesetting?

- Everybody everywhere uses Word.
- LaTeX is a *programming language*
- LaTeX final documents have to be compiled (this presentation takes about 10 seconds on first compile)
- Word is *much better* than it used to be re: generating ToCs, using templates, etc.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What is LaTeX?

What is... TEX?

- Invented by Donald Knuth in 1978.
- Intended as a replacement for the Unix *troff* command, which by 1978 was apparently a very patchy mess.
- So rather than make more patches, Knuth developed TEX.

So what is LaTeX? It's TeX with added sauce:

- Optimized for publishing
- Numbering, cross-referencing
- Tables and figures
- Page layout
- Bibliographies

The **structure** of a LaTeX document.

20240312-latex.tex

```
%\documentclass{beamer}
\documentclass[handout]{beamer} % set [handout] as an option to remove
/pause breaks
\beamertemplatenavigationsymbolsempty % for eliminating the nav buttons.
Handy!


%\setbeameroption{show notes on second screen=right} % Make sure slide
position is set to "right" in pympress also, or if using pdfpc, with
--notes=right
% Also, comment out the notes to produce slides for archiving, etc.
\usetheme{McMaster}
% There's no McMaster specific template and *THERE SHOULD BE*
% ... so I made one!
% use pympress on the rendered pdf to have things like second screen, notes,
etc! Cool!
% EXTREMELY IMPORTANT: if you are *sharing this content over Teams on your
Linux laptop*, for instance, do the following:
% Boot Ubuntu
% Select Xorg from login menu (sigh)
% use CHROME to access teams: e.g. google-chrome teams.microsoft.com
% Share the pympress main presentation window using the share tray.
\usepackage{verbatim}
\usepackage{fancyvrb}
\usepackage{tikz}
\usepackage{chemfig}
%\usepackage{mathtools}
\usepackage[version=4]{mhchem}
\usepackage[export]{adjustbox} % for left/right justifying images

%title page details:
\title{Introduction to \LaTeX{}}
\author{John Fink}
\institute{McMaster University}
\date{March 13, 2024}


\begin{document}
```

```
\documentclass{beamer}
\usetheme{McMaster}
\usepackage{verbatim}
\usepackage{fancyvrb}
%comments start with a % sign.

.
```

```
%title page details:
\title{Introduction to \LaTeX{}}
\author{John Fink}
\institute{McMaster University}
\date{October 23, 2025}
```

So just about any LaTeX specific markup will look like:

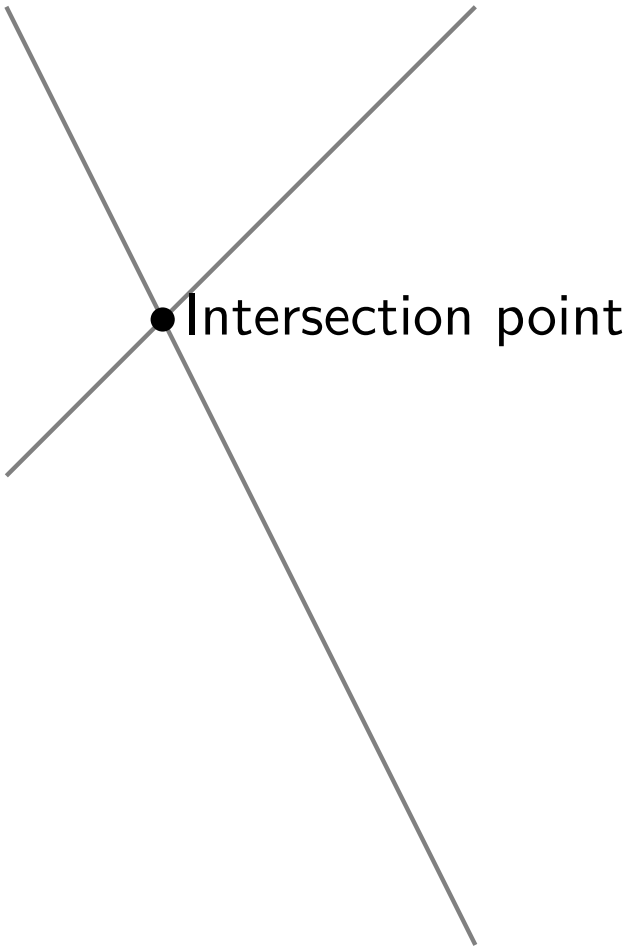
- A \ character
- A **command**, like *includegraphics*
- **options** passed to the command, in `[]`, like `[height=8cm]`
- The information fed to the command, in `{}`, like `{imagename}`
- So, the command `\includegraphics[height=8cm]{imagename}` will display the image titled *imagename*, scaled to 8cm height.

Drawing in LaTeX with the tikz package

Drawing in LaTeXwith the tikz package

```
\begin{tikzpicture}
\draw[gray, thick] (-1,2) -- (2,-4);
\draw[gray, thick] (-1,-1) -- (2,2);
\filldraw[black] (0,0) circle (2pt) node[anchor=west]{Intersection point};
\end{tikzpicture}
```

Drawing in LaTeXwith the tikz package



Doing Math Stuff in LaTeX

- Inline formulas are done with `$..$` or `\..\` or `\begin{math}..\end{math}`
- (these are all, as far as I know, identical in use)
- e.g. the universal law of gravitation: $F = \frac{Gm_1 m_2}{r^2}$.
- In code: `$F=\frac{Gm_1 m_2}{r^2}$`.

Doing Math Stuff in LaTeX

- Display mode formulas are done with `\..\`, `\begin{displaymath}..\end{displaymath}`, `\begin{equation}..\end{equation}`

$$E = m \tag{1}$$

```
\begin{equation}
        E=m
\end{equation}
```

Tables in LaTeX

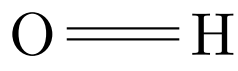
Left	Center	Right	Paragraph
1	1	1	Lorem ipsum dolor sit amet, consectetuer adipiscing elit.
12	12	12	Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis.
123	123	123	Curabitur dictum gravidamauris.

```
\begin{tabular}{||l|c|r|p{6cm}||}
        Left & Center & Right & Paragraph \\
        1 & 1 & 1 & Lorem ipsum dolor sit amet, consectetuer a
        12 & 12 & 12 & Ut purus elit, vestibulum ut, placerat
        123 & 123 & 123 & Curabitur dictum gravidamauris. \\
\end{tabular}
```

Chemical formulae in LaTeX

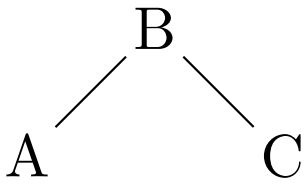
Chemical formulas are written similarly to math formulas, except support for chemical formulas is not built-in but requires a usepackage statement, like `\usepackage{chemfig}`

Chemical formulae in LaTeX

- A simple example: 
- `\chemfig{O=H}`

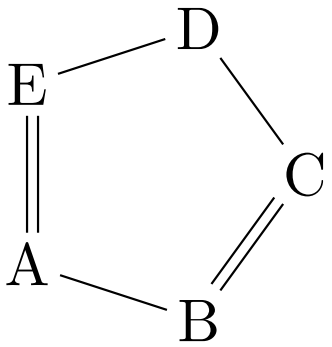
Chemical formulae in LaTeX

- Angled formulae:



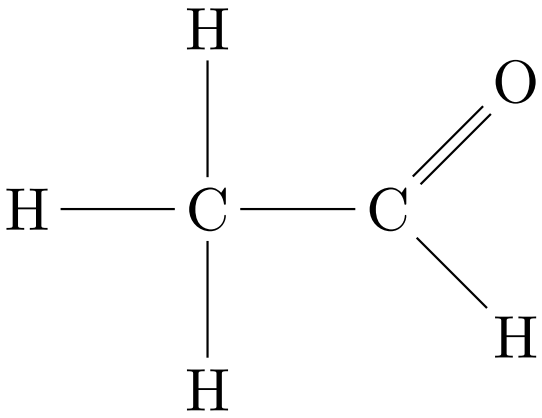
- `\chemfig{A-[1]B-[7]C}`

Chemical formulae in LaTeX

- Regular polygons
- 

- `\chemfig{A*5(-B=C-D-E=)}`

Chemical formulae in LaTeX

- Branched molecules
- 

- `\chemfig{H-C(-[2]H)(-[6]H)-C(=[1]O)-[7]H}`

Chemical formulae in LaTeX

For *typesetting* chemical formulae, we can use a package like *mhchem* in our preamble: `\usepackage{mhchem}`

Chemical formulae in LaTeX

- $3\,H_2O$
- `\ce{3H2O}`
- $AgCl_2^-$
- `\ce{AgCl2-}`
- $H_{2(aq)}$
- `\ce{H2_{(aq)}}`

LaTeXresources: Editors

- Anything that can edit plain text (Emacs, Vim, Notepad etc)
- (but note you need a *compiler* to generate the actual output)
- Compilers: MikTeX(Windows), MacTeX(MacOS), TeXLive (Linux)
- Purpose-built editors: TeXstudio, TeXmaker
- (These will come with built-in support for compilers)
- General IDEs: vscode, others
- Online: Overleaf (gdocs-esque)

Signing up for Overleaf

1. Go to www.overleaf.com/register
2. Sign up for an account by whatever method you prefer
3. Create a new blank project.
4. Type "done" in the chat.

Any questions?

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https://glammr.us/@jbfink