Introduction to Latex

Anita Bahmanyar
bahmanyar@astro.utoronto.ca
November 2016

U of T Coders

Installing Latex

- MikTex (http://miktex.org/) - for Windows
- proTeXt (http://www.tug.org/protext) - for Windows
- MacTex (http://www.tug.org/mactex/) - for Mac

- Sharelatex (www.sharelatex.com) - Online
- Overleaf (www.overleaf.com) - Online

Introduction

- It is pronounced as Lay-tech or Lah-tech
- It is a markup language similar to HTML (instructions mentioned in tags and text)
- Used widely in academia
- Written as LaTeX

Why Latex?

- Intended for authors to focus on writing instead of formatting and visualization while writing
- Easy to include math equations
- Good for large documents (cross-referencing)
- Automatic generation of bibliography
- Looks pretty compared to MS Office!
- Its free!

Structure

- There are many files generated while creating a latex document including .log, .tex, .bib
- .tex is the file we will be editting

Structure

- Document Class
  - {article, report, book, letter}, font, fontsize
  - \documentclass[12pt]{article}
- Packages
  - Graphics, math, formatting
  - \usepackage{geometry}
- Main Body
  - Text, sections and bibliography

Example

```
\documentclass{article}
\usepackage{}
\title{Introduction to Latex}
\author{Anita Bahmanyar}
\date{November 9, 2016}
\begin{document}
\maketitle
Hello world!
\end{document}
```

Example

```
\documentclass{article}
\usepackage{}
\title{Introduction to Latex}
\author{Anita Bahmanyar}
\date{November 9, 2016}
\begin{document}
\maketitle
Hello world!
\end{document}
```

Document Class

Example

```
\documentclass{article}
\usepackage{}
\title{Introduction to Latex}
\author{Anita Bahmanyar}
\date{November 9, 2016}
\begin{document}
\maketitle
Hello world!
\end{document}
```

Packages

Example

```
\documentclass{article}
\usepackage{}
\title{Introduction to Latex}
\author{Anita Bahmanyar}
\date{November 9, 2016}
\begin{document}
\maketitle
Hello world!
\end{document}
```

Main Body

Example

Introduction to Latex

Anita Bahmanyar

November 9, 2016

Hello world!

Lists

Lists

- Numeric

```
\begin{enumerate}
    \item point 1
    \item point 2
\end{enumerate}
```

1. point 1
2. point 2

Lists

- Numeric

```
\begin{enumerate}
    \item point 1
    \item point 2
\end{enumerate}
```

1. point 1
2. point 2

- Points

```
\begin{itemize}
    \item point 1
    \item point 2
\end{itemize}
```

- point 1
- point 2

Nested Lists

```
\begin{enumerate}
    \item point 1
    \begin{enumerate}
            \item nested point 1
            \begin{enumerate}
                \item nested nested point 1
            \end{enumerate}
    \end{enumerate}
    \item point 2
\end{enumerate}
```

Nested Lists

```
\begin{enumerate}
   \item point 1
   \begin{enumerate}
         \item nested point 1
         \begin{enumerate}
            \item nested nested point 1
         \end{enumerate}
   \end{enumerate}
   \item point 2
\end{enumerate}
```

1. point 1
    (a) nested point 1
        i. nested nested point 1
2. point 2

Images

- \usepackage{graphicx}

```
\begin{figure}[H]
        \centering
        \includegraphics[scale=size]{filename}
        \caption{}
        \label{fig:label}
\end{figure}
```

Images

- \usepackage{graphicx}

```
\begin{figure}[H]
        \centering
        \includegraphics[scale=size]{filename}
        \caption{}
        \label{fig:label}
\end{figure}
```

[h] : here [t] : top
[b] : bottom [p] : separate page

Figure 1: write your caption here

http://www.clipartkid.com/

Equations

- \usepackage{amsmath} for math equations

Equations

- \usepackage{amsmath} for math equations

Example:

- \begin{equation}
  f(x) = \frac{x^2 + 1}{5} \int x dx
- \end{equation}

Equations

- \usepackage{amsmath} for math equations

Example:

- \begin{equation}
  f(x) = \frac{x^2 + 1}{5} \int x dx
- \end{equation}

$$f(x) = \frac{x^2 + 1}{5} \int x dx$$

Equations

- Inline math mode can be inserted using $ math equation here$

Equations

- Inline math mode can be inserted using $ math equation here$

Example:

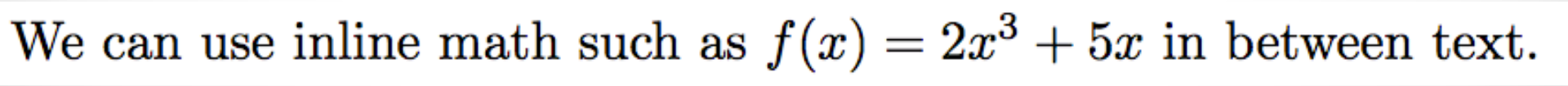
We can use inline math such as $f(x) = 2x^3 + 5x$ in between text.

Equations

- Inline math mode can be inserted using $ math equation here$

Example:

We can use inline math such as $f(x) = 2x^3 + 5x$ in between text.

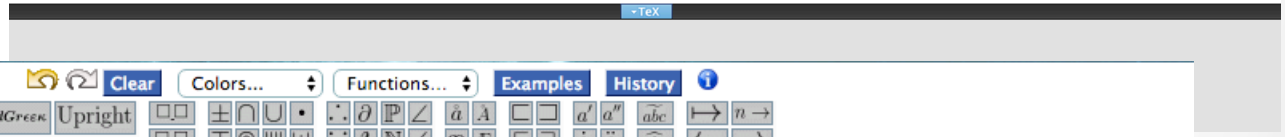


Equations

- \sqrt{x} $\sqrt{x}$
- \frac{x}{y} $\frac{x}{y}$
- \int y dy $\int y dy$
- \alpha, \beta, … α, β, ξ
- \frac{\partial f}{\partial x} $\frac{\partial f}{\partial x}$

Online Equation Editors

- Daum Equation Editor
- Codecogs



Tables

```
\begin{tabular}{| l l l |}
\hline
Column 1 & Column 2 & Column 3 \\ \hline
A & B & C \\ \hline
D & E & F \\ \hline
\end{tabular}
```

Tables

```
\begin{tabular}{| lll |}
\hline
Column 1 & Column 2 & Column 3 \\ \hline
A & B & C \\ \hline
D & E & F \\ \hline
\end{tabular}
```

Column 1	Column 2	Column 3
A	B	C
D	E	F

Bold/ Italic/ underlined

Bold/ Italic/ underlined

- \textbf{text} : bold face text

text

Bold/ Italic/ underlined

- \textbf{text} : bold face text

text

- \textit{text} : italic text

text

Bold/ Italic/ underlined

- \textbf{text} : bold face text **text**
- \textit{text} : italic text *text*
- \underlined{text} : underlined text <u>text</u>

Cross-referencing

- Use \label{} to reference figures, tables, equations, sections, etc
- For reference:

  \label{fig:labelname}
- For calling the label:

  \ref{fig:labelname}

fig, sec, eq, etc

Bibliography

Method 1:

Bibliography inside the file

```
\begin{thebibliography}{}
        \bibitem{reference 1}
        \bibitem{reference 2}
\end{thebibliography}
```

We can cite it as: **\cite{reference 1}**

Bibliography

Method 2:

Using a separate .bib file:

Inside .tex file:

\bibliographystyle{bibstyle}

\bibliography{filename}

Bibliography styles can be found at:

https://www.sharelatex.com/learn/Bibtex_bibliography_styles

Bibliography

```
@article{einstein,
    author =        "Albert Einstein",
    title =         "{Zur Elektrodynamik bewegter K{\"o}rper}. ({German})
        [{On} the electrodynamics of moving bodies]",
    journal =       "Annalen der Physik",
    volume =        "322",
    number =        "10",
    pages =         "891--921",
    year =          "1905",
    DOI =           "http://dx.doi.org/10.1002/andp.19053221004"
}

@book{latexcompanion,
    author    = "Michel Goossens and Frank Mittelbach and Alexander Samarin",
    title     = "The \LaTeX\ Companion",
    year      = "1993",
    publisher = "Addison-Wesley",
    address   = "Reading, Massachusetts"
}

@misc{knuthwebsite,
    author    = "Donald Knuth",
    title     = "Knuth: Computers and Typesetting",
    url       = "http://www-cs-faculty.stanford.edu/\~{}uno/abcde.html"
}
```

Bibliography

```
@article{einstein,
    author =        "Albert Einstein",
    title =         "{Zur Elektrodynamik bewegter K{\"o}rper}. ({German})
        [{On} the electrodynamics of moving bodies]",
    journal =       "Annalen der Physik",
    volume =        "322",
    number =        "10",
    pages =         "891--921",
    year =          "1905",
    DOI =           "http://dx.doi.org/10.1002/andp.19053221004"
}

@book{latexcompanion,
    author    = "Michel Goossens and Frank Mittelbach and Alexander Samarin",
    title     = "The \LaTeX\ Companion",
    year      = "1993",
    publisher = "Addison-Wesley",
    address   = "Reading, Massachusetts"
}

@misc{knuthwebsite,
    author    = "Donald Knuth",
    title     = "Knuth: Computers and Typesetting",
    url       = "http://www-cs-faculty.stanford.edu/\~{}uno/abcde.html"
}
```

Entry Type

Bibliography

```
@article{einstein,
    author =        "Albert Einstein",
    title =         "{Zur Elektrodynamik bewegter K{\"o}rper}. ({German})
        [{On} the electrodynamics of moving bodies]",
    journal =       "Annalen der Physik",
    volume =        "322",
    number =        "10",
    pages =         "891--921",
    year =          "1905",
    DOI =           "http://dx.doi.org/10.1002/andp.19053221004"
}

@book{latexcompanion,
    author    = "Michel Goossens and Frank Mittelbach and Alexander Samarin",
    title     = "The \LaTeX\ Companion",
    year      = "1993",
    publisher = "Addison-Wesley",
    address   = "Reading, Massachusetts"
}

@misc{knuthwebsite,
    author    = "Donald Knuth",
    title     = "Knuth: Computers and Typesetting",
    url       = "http://www-cs-faculty.stanford.edu/\~{}uno/abcde.html"
}
```

Reference name

Bibliography

```
@article{einstein,
    author =        "Albert Einstein",
    title =         "{Zur Elektrodynamik bewegter K{\"o}rper}. ({German})
        [{On} the electrodynamics of moving bodies]",
    journal =       "Annalen der Physik",
    volume =        "322",
    number =        "10",
    pages =         "891--921",
    year =          "1905",
    DOI =           "http://dx.doi.org/10.1002/andp.19053221004"
}

@book{latexcompanion,
    author    = "Michel Goossens and Frank Mittelbach and Alexander Samarin",
    title     = "The \LaTeX\ Companion",
    year      = "1993",
    publisher = "Addison-Wesley",
    address   = "Reading, Massachusetts"
}

@misc{knuthwebsite,
    author    = "Donald Knuth",
    title     = "Knuth: Computers and Typesetting",
    url       = "http://www-cs-faculty.stanford.edu/\~{}uno/abcde.html"
}
```

Reference Information

References

- https://www.sharelatex.com/learn/Bibliography_management_with_bibtex
- https://www.sharelatex.com/learn/Bibtex_bibliography_styles
- http://www.howtotex.com/download/FiveMinuteGuideToLaTeX.pdf

Questions?

Extra Slides

Tables

```
\begin{table}[h!]
\caption{Title} % title of Table
\centering      % used for centering table
\begin{tabular}{| c | c | c | c | } % centered columns (4 columns)
\hline %inserts double horizontal lines
 &  Column 1 &  Column 2 & Column 3  \\ [0.5ex] % inserts table

%heading
\hline % inserts single horizontal line

Row 1 & 1 &  2  &  3   \\ \hline
Row 2 & 4 &  5  &  6   \\ \hline
Ro2 3 & 7 &  8  &   9  \\%[1ex] %adds vertical space
\hline %inserts single line
\end{tabular}
\label{table:table1} % is used to refer this table in the text
\end{table}
```

Tables

Table 1: Title

	Column 1	Column 2	Column 3
Row 1	1	2	3
Row 2	4	5	6
Ro2 3	7	8	9