Writing papers and thesis using LaTeX2e

Part I: Writing papers using LaTeX

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Sections

- To generate sections in LaTeX: `\section{name-here}`
- Subsection: `\subsection{name-here}`
- Subsubsection: `\subsubsection{name-here}`
- Subsections without numbering `\subsection*{name-here}`

Sections

```
\documentclass{article}
\begin{document}

\section{Introduction}

The problem of \ldots

\section{Method}

We investigate \ldots

\subsection{Sample Preparation}

\subsection{Data Collection}

\section{Results}

\section{Conclusion}

\end{document}
```

1 Introduction

The problem of . . .

2 Method

We investigate . . .

2.1 Sample Preparation

2.2 Data Collection

3 Results

4 Conclusion

Title and Abstract

Before you begin typing your document, i.e., \begin{document} you need to define the author name and title.

- Title of the document in LaTeX: \title{name-here}
- Author name: \author{name-here}
- Set a specific date: \date{date-here}
- How do you not print date: \date{}

This only defines what the title of the document, author name and date create. It does not print it. To print the meta-data, do \maketitle after begin document

Title and Abstract

- Tell LaTeX the `\title` and `\author` names in the preamble.
- Then use `\maketitle` in the document to actually create the title.
- Use the abstract environment to make an abstract.

```
\documentclass{article}

\title{The Title}

\author{A. Author}

\date{\today}

\begin{document}
\maketitle

\begin{abstract}
Abstract goes here...
\end{abstract}

\end{document}
```

The Title

A. Author

November 11, 2014

Abstract

Abstract goes here...

\documentclass[**options**]{}

Argument	Possible Values	Default Value
Typeface Size	10pt, 11pt, 12pt	10pt
Paper Size	a4paper, a5paper, letterpaper, legalpaper executivepaper b5paper	letterpaper
Paper Orientation	portrait, landscape	portrait
Title Page	titlepage, notitlepage	titlepage
Equation Numbering	leqno	Right side
Equation Alignment	fleqn	Centered
Output Type	draft, final	final
Layout Type	oneside, twoside	oneside
Chapter Opening	openright, openany	openright
Columns	onecolumn, twocolumn	onecolumn

Font types

Font face

\emph{*text*}, \textbf{**text**}, \textit{*text*}, \texttt{text}, \textrm{text (roman)}, \textsf{text (sans font)}, \textsc{TEXT}

Font size

\tiny, \scriptsize, \footnotesize, \small, \normalsize, \large, \Large, \LARGE,

\huge, \Huge

Alignment

```
\begin{flushleft / flushright / center}
...
\end{flushleft / flushright / center}
```

Exercise 4: Sections

- Add title, author and print date
- Set font size to 11 pt
- Create sections and subsections

> Click to open this exercise in **writeLATEX**

- Hint: Don't forget to do $\backslash$maketitle and don't forget begin{document} and end{document} click here to see my solution .

Typesetting Maths

- Why are dollar signs $\boxed{\$}$ special? We use them to mark mathematics in text.

`% not so good:`
`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.

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

- Always use dollar signs in pairs — one to begin the mathematics, and one to end it.
- LaTeX handles spacing automatically; it ignores your spaces.

`Let $y=mx+b$ be \ldots`	Let $y = mx + b$ be ...
`Let $y = m x + b$ be \ldots`	Let $y = mx + b$ be ...

Notation

- Use caret ^ for superscripts and underscore ' _ ' for subscripts.

`$y = c_2 x^2 + c_1 x + c_0$`	$y = c_2x^2 + c_1x + c_0$

- Use curly braces { and } to group superscripts and subscripts.

`$F_n = F_n-1 + F_n-2$` `% oops!`	$F_n = F_n - 1 + F_n - 2$
`$F_n = F_{n-1} + F_{n-2}$` `% ok!`	$F_n = F_{n-1} + F_{n-2}$

- There are commands for Greek letters and common notation.

`$\mu = A e^{Q/RT}$`	$\mu = Ae^{Q/RT}$
`$\Omega = \sum_{k=1}^{n} \omega_k$`	$\Omega = \sum_{k=1}^{n} \omega_k$

Title and Abstract: Displayed Equations

- If it's big and scary, *display* it on its own line using `\begin{equation}` and `\end{equation}`.

```
The roots of a quadratic equation
are given by
\begin{equation}
x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \,.
\end{equation}
where $a$, $b$ and $c$ are \ldots
```

The roots of a quadratic equation
are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \,. \qquad (1)$$

where a, b and c are ...

Caution: LaTeX mostly ignores your spaces in mathematics, but it can't handle blank lines in equations — don't put blank lines in your mathematics.

- You can add punctuations in your equation by adding `\,.` to add a period and `\,,` to add a comma at the end of the equation.

Ex 5a: Maths

- Format these two equations:

$$i\hbar\frac{\partial}{\partial t}\Psi(r,t) = \left[\frac{-\hbar^2}{2\mu}\nabla^2 + V(r,t)\right]\Psi(r,t),$$

$$E^2 = (pc)^2 + (m_0c^2)^2.$$

Click to open this exercise in **writeLATEX**

- To format math you need to use `equation` environment
- Use detexify to find out what the symbols are
  http://detexify.kirelabs.org/classify.html click here to see my solution .

Packages

Packages allow you to further customize LaTeX

The command:

`\usepackage{amsmath}`

Common packages

Environment	Packages
Maths	amsmath, amsfonts, amssymb
Maths Times Font	mathptx
Figures	graphicx, epsfig
Table	tabularx, booktabs
Pagelayout	geometry
Hyperlinks	hyperref
Algorithms and code	algpseudocode, algorithm, listings
Color	color, xcolor

Ex 5b: Maths

- Align equations as shown below:

$$y = ax + b$$
$$y + 1 = ax + (b+1) \tag{2}$$
$$= ax + (b+2) - 1 \tag{3}$$

$$y = ax + b$$
$$y + 1 = ax + (b+1)$$
$$= ax + (b+2) - 1 \tag{4}$$

> Click to open this exercise in **writeLATEX**

- Insert cross references use `\usepackage{cleveref}`.
- Use `align` environment. To use this environment you need include `\usepackage{amsmath}` and `\usepackage{amsfonts}` packages.

> click here to see my solution