LaTeX Class
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Contents

Abstract

LaTeX is widely used in typesetting mathematics. In this class you will review the basic LaTeX commands as well as ways to use LaTeX to fit your needs.

1 Table of Contents

You can add a table of contents to your paper very easily. All you need to do is add \tableofcontents. The table of contents will give you all the sections and subsection, etc., with their page numbers. However, sometimes you need to add extra information to the table of contents that you only want on the contents page. You do this by adding \addcontentsline.

Adding to Contents

This section is not numbered, however, you want it to appear in the table of contents.

2 Make an Index

You can make an index at the end of your paper by labeling certain information.

3 Sections

When you type your first section, it will start with number 1. The next section will be 2, etc.

3.1 Subsections

When you type your first subsection, it will start with 1.1, then 1.2, etc. You can change the numbering from Arabic to Roman by creating a \renewcommand. For example:

IV This is a Roman Numbered Section

This will now number the section in Roman Numerals. You can also replace \Roman with \roman (lower case roman numerals), \alph (a,b,...,z), or \Alph (A,B,...,Z).

IV.0.1 Subsubsections

You can have a subsubsection after a subsection. It will number everything correctly.

There is also a \paragraph and a \subparagraph. They look like this:

Paragraph This is the paragraph.yellow

Subparagraph This is the subparagraph.

5 Theorems, Lemmas, etc.

When you need to add a Theorem, Lemma, Proposition, etc., you may need to create the appropriate environment. For example:

```
\newtheorem{theorem}{Theorem}
```

and

```
\newtheorem{lemma}{Lemma}
```

in the preamble you will get the following:

Theorem 1. *This is the first theorem.*

Theorem 2. *This is the second theorem.*

Lemma 1. *This is the first lemma.*

You can add extra comments to the Theorem, etc.,

Theorem 3 (Add this). *This is the third theorem.*

6   Tables and Figures

Table 1: This is the First Table.

Name	1	2	3
Sam	2.00	23.5	1.00
Joe	3.00	5.9	8.00

Our next example is a Figure.

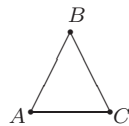Figure 1: This is a design done in LaTeX picture.

7   Itemizing

There are many ways to itemize lists. One way is to use the \begin{itemize} \end{itemize}

- This is the first example.

- When using this format you get a bullet mark to identify the item.

– When you do another itemize in an itemize environment you get a –, etc.

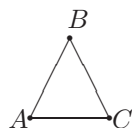If you need numerals, use the enumerate command

1. This is the first numbered list.

2. When using this format you get a numbered list.

   (a) When you do another enumerate in an enumerate environment you get an (a), etc.

   (b) You can also put a frame around a word by using \fbox, i.e., Meet me in the square. You can also change the thickness of the frame.

   (c) You can raise or lower words in a line by using the \raisebox command.

You can also change the default with adding the information you need in brackets after the \item command. For example:

* This has an asterisk instead of a bullet.

8   Graphics

There are many way to create graphics using LATEX. One of those ways is by using the picture environment. See the example below.

You can also import a picture

Figure 2: This is the TUG logo.

9 Footnotes

Footnotes[1] are easy to do with LaTeX.

10 Math

LaTeX is also very good at typesetting mathematical formulas like: $x - 3y = 7$ or $a_1 > x^{2n}/y^{2n} > x'$.

10.1 Displayed Math

Mathematical formulas may be placed within paragraphs of text. But they may also be "displayed." In displayed math formulas, the formulas are displayed between lines of text, as shown below:

$$x' + y^2 = z_i^2.$$

There are times when you need equations to be labeled (1a), (1b), etc. One way you can do this is by subequations. You can also refer to it as just Equation (1).

$$x + y = z \tag{1a}$$

---

[1]This is an example of a footnote.

$$z = x + y \tag{1b}$$

11 Special Commands

LaTeX interprets some common characters as commands, so you must type special commands to generate them. These characters include the following: $, &, %, #, {, and }.

12 Macro Writing

Macro writing is used to make your typing easier.

    `I like \TeX.`   I like TeX.

    `I like \LaTeX.`   I like LaTeX.

is easier to write than

```
I like T\kern-.1667em\lower.5ex\hbox{E}\kern-.125emX\@.
I like L\kern-.36em{\setbox0\hbox{T}\vbox to\ht0{%
  \hbox{$\m@th$\csname S@\f@size\endcsname\fontsize
  \sf@size\z@\math@fontsfalse\selectfont A}\vss}}%
  \kern-.15em T\kern-.1667em\lower.5ex\hbox{E}\kern-.125emX\@
```

    It is important to spaces after macro names.

    `\TeX has been good to me.`   TeXhas been good to me.

    `\TeX has been good to me.`   TeX has been good to me.

Another reason to use macros is when you need the same expression with different arguments. This macro:

```
\def\mat#1#2#3#4{\left(\begin{array}{cc}#1 & #2\\
                #3 & #4\end{array}\right)}
```

produces this:

$$\begin{pmatrix} 3x & -2y \\ -x & 2y \end{pmatrix}$$

by only having to type

```
\[ \mat{3x}{-2y}{-x}{2y} \]
```

13 Bibliographies

There are different ways to do Bibliographies. One way is to use BIBTEX. Create a BIBTEX file and include the appropriate information:

```
\bibliographystyle{plain}
\bibliography{paper}
```

The bibliographystyle explains which style you are using. The bibliography line is the .bib file which is used.

In the .bib file use the proper environment, for example,

```
@book{lamport86,
  author = "Leslie Lamport",
  title = {\LaTeX: A Document Preparation System",
  publisher = "Addison--Wesley",
  year = 1986,
}
```

You can use this reference in the line of text by typing \cite{lamport86}. When you do this you get the reference number [1] . If you do not want to show the reference number anywhere in the paper, however you need to use it as a reference you can say \nocite{weening}. It will then only appear in the References section.

14   Labeling and Referencing

Throughout these examples the sections have been labeled. That is so you can reference them in your paper. For example if you want to refer to the first section. You can say Section 3 was very interesting. You can also reference papers by using a page reference \pageref, i.e., Please see Page 2 for an example on Theorems.

15   Marking the Margin of a Paragraph

This will mark the current paragraph with a line in the margin. You might want to do this if you want to bring attention to a specific margin in your paper.

   You can also add words in the margin if you want to add a specific statement that you want the reader to notice that is not necessarily in the paragraph itself.

See this statement.

16   Text in Columns

You can typeset a paper in a regular paragraph form. Which will go along until the margin that was set. Then if you need to you can change the number of columns to suit your needs.

   Now you can continue typing as usual only the column will not be in single column format, it will change to the amount of columns you suggest.

An Added Title

Now you can continue typing as usual only the column will not be in single column format, it will change to the amount of columns you suggest.

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Now you can continue typing as usual only the col-umn will not be in single column for-mat, it will change to the amount of columns you sug-gest.

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Appendix

A   List of Tables

List of Tables

B   List of Figures

List of Figures

References

[1] Leslie Lamport. *LaTeX: A Document Preparation System.* Addison–Wesley, 1986.

[2] Joe Weening. Macro writing.