A Beginner's Guide to Essential LaTeX Elements

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1 Introduction

This document introduces the basic elements of LaTeX in a simple, beginner-friendly way. For each feature, we'll show both the code and its rendered output.

2 Document Structure

Every LaTeX document has a basic structure:

```
\documentclass{article} % or report, book, etc.
\begin{document}
% Your content goes here
\end{document}
```

The `documentclass` defines the type of document. Common classes are:

- `article`: For short documents, papers
- `report`: For longer documents with chapters
- `book`: For books

3 Sections and Subsections

LaTeX provides automatic section numbering. Here's how to create them:

```
\section{Main Section}
\subsection{Subsection}
\subsubsection{Subsubsection}
```

This produces the section headings you see in this document.

4 Text Formatting

Basic text formatting commands:

```
\textbf{Bold text} \textit{Italic text}
\underline{Underlined} \texttt{Typewriter}
```

Rendered output: **Bold text** *Italic text* Underlined `Typewriter`

5 Lists

LaTeX offers two main list types:

5.1 Itemized Lists (Bullet Points)

```
\begin{itemize}
    \item First item
    \item Second item
\end{itemize}
```

Output:

- First item
- Second item

5.2 Enumerated Lists (Numbered)

```
\begin{enumerate}
    \item First item
    \item Second item
\end{enumerate}
```

Output:

1. First item
2. Second item

6 Mathematical Expressions

LaTeX excels at typesetting mathematics. There are two main environments:

6.1 Inline Math

Surround math with dollar signs:

```
The Pythagorean theorem: $a^2 + b^2 = c^2$
```

Output: The Pythagorean theorem: $a^2 + b^2 = c^2$

6.2 Display Math

For centered equations on their own line:

```
\[ E = mc^2 \]
```

Output:

$$E = mc^2$$

6.3 Equation Environment

For numbered equations:

```
\begin{equation}
f(x) = x^2 + 2x + 1
\end{equation}
```

Output:

$$f(x) = x^2 + 2x + 1 \tag{1}$$

7 Tables

Creating tables in LaTeX:

```
\begin{tabular}{|l|c|r|}
\hline
Left & Center & Right \\ \hline
A & B & C \\ \hline
1 & 2 & 3 \\ \hline
\end{tabular}
```

Output:

Left	Center	Right
A	B	C
1	2	3

For professional-looking tables, use `booktabs`:

```
\begin{tabular}{lcc}
\toprule
Item & Quantity & Price \\ \midrule
Apples & 10 & \$1.00 \\
Oranges & 5 & \$1.50 \\ \bottomrule
\end{tabular}
```

Output:

Item	Quantity	Price
Apples	10	$1.00
Oranges	5	$1.50

8 Conclusion

This document covered the basic elements of LaTeX:

- Document structure
- Sections and formatting
- Lists and tables
- Mathematical expressions

References

For further learning:

- The Not So Short Introduction to LaTeX2e:
  `https://tobi.oetiker.ch/lshort/lshort.pdf`
- LaTeX Wikibook:
  `https://en.wikibooks.org/wiki/LaTeX`
- Overleaf Documentation:
  `https://www.overleaf.com/learn`