Introduction to \LaTeX

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Your abstract text goes here.

I. INTRODUCTION

\LaTeX looks more difficult than it is. It is almost as easy as $\pi$. See how easy it is to make special symbols such as $\alpha$, $\beta$, $\gamma$, $\delta$, $\sin x$, $\hbar$, $\lambda$, \ldots We also can make subscripts $A_x$, $A_{xy}$ and superscripts, $e^x$, $e^{x^2}$, and $e^{ax}$. We will use \LaTeX, which is based on \TeX and has many higher-level commands (macros) for formatting, making tables, etc. More information can be found in Ref. [1].

We just made a new paragraph. Extra lines and spaces make no difference. Note that all formulas are enclosed by \$ and occur in math mode.

The default font is Computer Modern. It includes italics or \emph{italics}, \bf{boldface} or \textbf{boldface}, slanted or \textit{slanted}, and \tt{monospaced} or \texttt{monospaced} (typewriter) fonts.

II. EQUATIONS

Let us see how easy it is to write equations.

$$\Delta = \sum_{i=1}^{N} w_i(x_i - \bar{x})^2.$$ \(1\)

It is a good idea to number equations, but we can have a equation without a number by writing

$$P(x) = \frac{x - a}{b - a},$$

and

$$g = \frac{1}{2} \sqrt{2\pi}.$$ \(2\)

Note the different ways of writing a ratio.

We can give an equation a label so that we can refer to it later.

Equation (2) expresses the energy of a configuration of spins in the Ising model [3].

We can define our own macros to save typing. For example, suppose that we introduce the macros:

\begin{verbatim}
\newcommand{\lb}{\langle}
\newcommand{\rb}{\rangle}
\end{verbatim}

Then we can write the average value of $x$ as

\begin{verbatim}
\begin{equation}
\lb x \rb = 3
\end{equation}
\end{verbatim}

The result is

$$\langle x \rangle = 3.$$ \(3\)

Examples of more complicated equations:

$$I = \int_{-\infty}^{\infty} f(x) \, dx.$$ \(4\)

We can do some fine tuning by adding small amounts of horizontal spacing:

\begin{verbatim}
\, small space \! negative space
\end{verbatim}

as is done in Eq. (4).

We can also align equations on separate lines:

$$y = a(x^2 + x + 3) = ax^2 + ax + 3a,$$ \(5\)

as well as do more fancy things:

$$\sum_i A \cdot B = -P \int \hat{n} \cdot dA = P \int \nabla \cdot r \, dV.$$ \(6\)

See Sec. VI for the use of other special symbols.

III. TABLES

Tables are a little more difficult until you get the knack. \TeX automatically calculates the width of the columns. Some interesting data are shown in Table I.

IV. LISTS

Some example of formatted lists include the following:

1. bread
2. cheese
   \begin{itemize}
   \item Tom
   \item Dick
   \end{itemize}
V. FIGURES

An example of a figure that represents a plot of some familiar \( y \) vs. \( x \) data is shown in Fig. 1. We can make figures bigger or smaller by scaling them. Figure 1 (2) has been reduced to 60\% (40\%) of its original size.

![Graph of y vs. x](image1)

**FIG. 1:** A generic graph of \( y \) vs. \( x \).

![Graph of y vs. x](image2)

**FIG. 2:** Same as Fig. 1, except smaller!

<table>
<thead>
<tr>
<th>lattice</th>
<th>( d )</th>
<th>( q )</th>
<th>( T_{\text{int}}/T_c )</th>
</tr>
</thead>
<tbody>
<tr>
<td>square</td>
<td>2</td>
<td>4</td>
<td>1.763</td>
</tr>
<tr>
<td>triangular</td>
<td>2</td>
<td>6</td>
<td>1.648</td>
</tr>
<tr>
<td>diamond</td>
<td>3</td>
<td>4</td>
<td>1.479</td>
</tr>
<tr>
<td>simple cubic</td>
<td>3</td>
<td>6</td>
<td>1.330</td>
</tr>
<tr>
<td>bcc</td>
<td>3</td>
<td>8</td>
<td>1.260</td>
</tr>
<tr>
<td>fcc</td>
<td>3</td>
<td>12</td>
<td>1.225</td>
</tr>
</tbody>
</table>

VI. SPECIAL SYMBOLS

A. Common Greek letters

These commands may be used only in math mode. Only the most common letters are included here.

\[ \alpha, \beta, \gamma, \Gamma, \delta, \Delta, \epsilon, \eta, \kappa, \lambda, \Lambda, \mu, \nu, \pi, \rho, \sigma, \tau, \phi, \Phi, \chi, \psi, \Psi, \omega, \Omega \]

B. Special symbols

The derivative is defined as

\[ \frac{dy}{dx} = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x} \]  

(7)

\[ f(x) \to y \quad \text{as} \quad x \to x_0 \]  

(8)

\[ f(x) \xrightarrow{x \to x_0} y \]  

(9)

Order of magnitude:

\[ \log_{10} f \simeq n \]  

(10)

\[ f(x) \sim 10^n \]  

(11)

Approximate equality:

\[ f(x) \simeq g(x) \]  

(12)

LaTeX is simple if we keep everything in proportion:

\[ f(x) \propto x^3. \]  

(13)

Finally we can skip some space by using commands such as

\[ \backslash \text{bigskip} \quad \backslash \text{medskip} \quad \backslash \text{smallskip} \quad \backslash \text{vspace}\{1pc\} \]

The space can be negative.
