An example of Latex in action

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Abstract

This article gives an example of how to write mathematical documents using the \LaTeX{} package.

1 Introduction

Everyone learns \LaTeX{} by borrowing someone else’s document. That’s what this is for. There are also books, articles and lots of web pages which explain valuable things. A good place to look for help on the web is here:

http://www-h.eng.cam.ac.uk/help/tpl/textprocessing/

You can write text in \textbf{bold face} or \textit{italics (emphasised)} or \texttt{sans serif font} or in \texttt{typewriter style}.

You can write text in \textbf{large letters} or \textbf{larger letters} or \textbf{even larger letters} or \textbf{the hugest letters}.

2 Formulae

The best thing about \LaTeX{} is that it makes nice mathematical formulae for you. Possibly the three most important tools are superscripts, subscripts and fractions, for example:

\[
    x_1^{77} \quad a_{1,2}^{38} \quad \frac{2 + x}{x^2 + 1} \quad \frac{1}{2}.
\]

Formulae can be written as part of the line, such as \( \int_0^2 e^x \, dx \), or in display mode like

\[
    \frac{\sin(x)}{x^2 + e^x + 23}.
\]

The above equation does not have an equation number. Giving equations numbers is easy, and they can be referred to in the following way: see equation (1) below

\[
    \sum_{i=0}^{N_3} \binom{N_4}{i} \frac{x^i}{i!}
\]
You can do equations on several lines, such as

\[
\begin{align*}
  f(x) & = (x + 1)(x + 2)(x + 3) \\
        & = x^3 + 6x^2 + 11x + 6
\end{align*}
\]

or without numbers as

\[
\begin{align*}
  f(x) & = (x + 1)(x + 2)(x + 3) \\
        & = x^3 + 6x^2 + 11x + 6.
\end{align*}
\]

References are done like this \cite{2}.

Greek letters are obtained in mathematics mode, for example \(\alpha, \beta, \gamma, \Gamma, \delta, \Delta, \ldots\). Other fonts are available for mathematics, such as calligraphic \(\mathcal{A}, \mathcal{B}\) and blackboard bold \(\mathbb{A}, \mathbb{R}\). One can do underlining and overlining

\[x \in \overline{\mathbb{Q}}.\]

There are lots of built-in symbols such as \(\Rightarrow, \rightarrow, \in, <, \leq, \subset, \subseteq, \lfloor, \rfloor, \ast, \times, \ell, \mathfrak{g}, \perp\).

There are several ways to write modular arithmetic. For example \(a \equiv 23 \pmod{78}\) or \(a \equiv 23 \mod{78}\).

Operations can be negated, for example:

\[a \neq b, \quad a \not\equiv b \mod c.\]

The operations \texttt{\left} and \texttt{\right} are useful for making braces the right size:

\[
\left\{ 0, \frac{1}{2}, 1 \right\}, \quad \left( \sum_{i=1}^{3} (i^2 + 2) \right), \quad \left[ 1 + \frac{1}{2 + \frac{2}{i+1}} \right].
\]

Here is a table:

<table>
<thead>
<tr>
<th>(N)</th>
<th>Information about (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>A prime</td>
</tr>
<tr>
<td>3</td>
<td>A prime</td>
</tr>
<tr>
<td>4</td>
<td>A square</td>
</tr>
<tr>
<td>5</td>
<td>A prime</td>
</tr>
<tr>
<td>6</td>
<td>Half a dozen</td>
</tr>
</tbody>
</table>

In the next section you will find Theorem 3.1.

If you want to start on a new page then do this:
3 A theorem

Theorem 3.1 Let $E/F$ be an elliptic curve defined over a number field $F$. Let $\text{End}(E) = \mathcal{O}$ be an order of discriminant $D$. Let $p$ be a prime for which $E$ has good and supersingular reduction. Let $\varphi$ be a prime ideal of $F$ above $p$. Let $\hat{E}$ over $k = \mathbb{F}_{p^m}$ be the reduction mod $\varphi$ of $E$. Let $\pi$ be the $p^m$-Frobenius map on $\hat{E}$. Suppose $r \mid \#E(\mathbb{F}_{p^m})$ is a prime such that $r > 3$ and $r \nmid pD$.

Let $d \in \mathbb{N}$ be such that $\sqrt{-d} \in \mathcal{O}$. Let $\Psi \in \text{End}(E)$ satisfy $\Psi^2 = -d$. Let $\psi \in \text{End}_{\mathbb{F}_p}(\hat{E})$ be the reduction mod $\varphi$ of $\Psi$. Then $\psi$ is a suitable distortion map for points $P \in \hat{E}[r]$ which lie in a $\pi$-eigenspace.

Proof. You don’t want to see the proof. \hfill \Box

4 More things

4.1 Subsections

This is subsection 4.1.

4.2 Spot the difference

Experts in Latex find that they like things a certain way, for example:

- “quotes” rather than ”quotes”.
- $a \mid b$ and $a \nmid b$ rather than $a | b$ and $a \nmid b$.

Doing references the right way is also important. Some examples are given below.

References


