Typesetting Mathematics in LaTeX

Dr. Milaan Parmar
milaanparmar9@gmail.com

August 9, 2021

1 Introduction

LaTeX is extremely powerful when it comes to typesetting mathematics. It's one of the core strengths of this system.

2 Displaying Mathematics

There are two ways of displaying maths. One is *inline* and the other is *display* format – in which the whole math sits on its own set of lines.

2.1 Inline Mode

We are going to insert a mathematics equation inline here using a pair of $ signs: $E = mc^2$. As you can see, the display (such as line spacing) does not get messed up by the mathematics as it does with word processing softwares.

2.2 Display Mode

We can also display equations in their own set of lines. To do this, we can use the equation environment.

$$E = mc^2 \tag{1}$$

As you can see, LaTeX inserts the equation number automatically. We can refer to it using the `\ref` command just as we referred to sections, figures and tables. (E.g. Equation 1.) To get rid of the equation number, simply use the *star variant* of the equation environment. (For this, you need the `amsmath` package.)

$$E = mc^2$$

Alternatively, we can use the shorthand keys `\[` and `\]`

$$E = mc^2$$

3 Mathematical Features

LaTeX has many builtin features and you can get many more easily. Here, we'll see some of these features:

Addition, subtraction, multiplication and division:

$$x + 2 - 25 \times 35 \div 98$$

Superscripts and subscripts:

$$x^2$$

$$x_{(i)}$$

Summation, union, intersection, big-union, integral:

$$\sum_{i=1}^{n} i^2$$

$$x \cup y \cap z$$

$$\bigcup_{i=1}^{n} x_i$$

$$\int_0^n x^2$$

Fractions, brackets, square root:

$$\frac{x}{y}$$

$$\frac{\sum_i x^2}{\int_0^n x^2}$$

$$\sqrt{\frac{\sqrt{36}}{x^5}}$$

$$2 \times \left(\frac{34}{\frac{124}{356}} \right)$$

Greek letters:

$$\alpha + \beta + \gamma^* + \Sigma + \Theta + 2_\epsilon$$

Matrices and vectors. For this, you need to include the `amsmath` package and then use the `bmatrix` or `pmatrix` environment:

$$\begin{pmatrix} \frac{a}{44} & b \\ c & \sqrt{d} \end{pmatrix}$$

Accents:

$$\hat{x}$$

$$\hat{\imath}$$

$$\dot{x}$$

See the `Math` menu in the IDE for other operations. You can refer to "Short Math Guide for LaTeX" for a lot more examples.

4 Using Symbols

You might come across situations where you need to find new symbols. For this, you can refer to the "The Comprehensive LaTeXSymbols List".

$$x \rightleftharpoons y$$

(Optional) Since this is a long command, we might want to create a shortcut using the `\newcommand` command in the preamble. This also allows us to later change the symbol without having to change the equations.

$$x \rightleftharpoons y$$