Introduction to using LaTeX

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Abstract

Paper abstract...

1 Introduction

1.1 Writing in Latex

This is an introduction to using Latex. The spacing in the .tex file does not affect the spacing in output file. If you wish to end a line in the output file, use the command.

Some basic formatting command can be used to control the size and font of writing. For example, this **command** is for bold face font and this *one* for italics. You can control the font size with commands like large, Large, small or tiny.

Sometimes paragraph indentations are a little touchy in Latex. To control the indentation to your specifications you can use the "\indent" and "\noindent" commands.

This line is indented.

1.1.1 Defining your own Latex Commands

In the preamble, I defined my own command using the "\def" command. I can call this command by $-\!\!\times\!\!-$. You can use this to make simple graphics, symbols, environments, etc that you may want to use in your document. For example, I made a simple figure of a cat $\Rightarrow\hat{\ }\nabla\hat{\ }\Leftarrow$.

2 Writing Math in Latex

In Latex, anytime you wish to use a command, it must be preceded by a $\backslash$. Depending on the function, it may have to me in a math environment, which is created by putting dollars signs before and after your command. For example, if I would like to write the fraction 1/2 I can use the built in command $\frac{1}{2}$, but this command must be used in a math environment. On the other hand if I would like to underline something, I would us the command and put whatever I want underlined inside the braces which does not require a math environment. Whether you need to use a command inside a math environment or not depends on the function that you are using.

There are different ways to create math environments. One that I used above is the in-line math environment, which is putting your math text between single dollar signs: $\gamma(\xi,t) = \frac{\partial}{\partial t}g(\xi,t) + \frac{d}{d\xi}\varphi(\xi)$. This will insert the text in the line you are typing. Another way to create a math environment is the double dollar signs

$$y_1(x) = e^{x^2-x+2} - 5x + 4.$$

The double dollar signs automatically start a new line and centers. Another way to create a math environment is using the align environment. This environment also allows you to control the alignment of equations.

$$\begin{aligned} y &= \cos^2(x) - \sin^4(x) + \cos(2x) && (1)\\ &= \cos^2(x) - (1-\cos^2(x))^2 + \cos^2(x) - \sin^2(x) && (2)\\ &= 3\cos^2(x) - 1 - (1 - 2\cos^2(x) + \cos^4(x)) && (3)\\ &= -\cos^4(x) + 5\cos^2(x) - 2 && (4) \end{aligned}$$

If you don't like the numbers labeling your equations, you can use the command

$$\begin{aligned} (x+y)^2 &= 6(x-1)^2 + 7y - 4\\ x^2 + 2xy + y^2 &= 6x^2 - 12x + 6 + 7y - 4\\ -5x^2 + 2xy + y^2 + 12x - 7y - 2 &= 0 \end{aligned}$$

You may also number some lines but not others using the "\notag" command:

$$\begin{aligned}\int_0^{2\pi} \sin(x)dx &= -\cos(x)|_0^{2\pi} \\ &= -\cos(0)+\cos(2\pi) \\ &= -1+1=0\end{aligned} \tag{5}$$

Matrices

Latex is also useful for creating matrices. This is usually done with the array environment. This environment must be inside of a math environment.

$$\begin{pmatrix} 1 & 4 & 3 & 2 \\ x & z & 0 & 4 \\ \alpha & y & \gamma & \beta \end{pmatrix}$$

There are lots of math commands that you can use to create different objects that you may want in your paper.

$$\begin{bmatrix} 1 & 0 & \cdots & 0 \\ 0 & 1 & & \vdots \\ \vdots & & \ddots & 0 \\ 0 & \cdots & 0 & 1 \end{bmatrix}$$

Since the curly brace is used for so many commands, if you just type in curly braces in a math environment, x, they will not appear in the output file. To make them show up, use the command $\{x\}$.

But if you want to make an object with one of these boundaries on one side only, you can use the "right." command.

$$f(x) = \begin{cases} 1 & x \in \mathbb{Q} \\ 0 & x \notin \mathbb{R}-\mathbb{Q} \end{cases}$$

The array command is used for matrices, and it must be in a math environment. You may also make tables in latex using the tabular environment

Column 1	Column 2	Column 3
something	write	here

3 Spacing in Latex

Some useful commands for spacing in Latex are "\hspace" for horizontal spacing and "\vspace" for vertical spacing. For example, puts a 3 centimeter space at that location. You may use other units of measurement like "in" or "pt". The "\hspace" can be used in text or in a math environment. Also you can use negative spacing: $\dashv$. The "\vspace" command is used in text for spacing.

You may use the other units of measure for the vertical spacing command as well
And again you can use negative values in the vertical spacing as well.

4 Graphics in Latex

Here is an example of including a picture in latex.

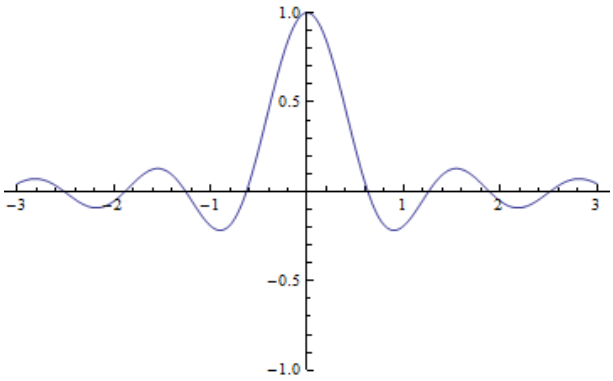

Figure 4

The picture can be referenced by figure 4. The size of the picture can be changed by changing the values in the “resizebox” command.

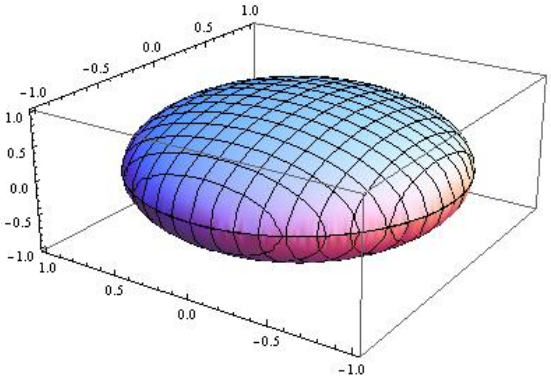

Figure 1: Description of the picture here

Now even if you change the order of where these two figures are places in the paper, you will still be able to refence them by name figure 4 and figure 1.

Here is an example of rescaling the picture using the resize box command:

You can insert text into a picture environment like this.

You can also to some interesting things with rotating pictures in a picture environment:




You can also put math text and symbols in a picture environment:

$$\lim_{\rightarrow 0} \frac{f(x+) - f(x)}{} = f'(x)$$

This is and example of referencing the bibliography. It is explained more in the bibliography. You can cite a particular reference in the text of you paper by [1]. Using this way of citing the resources will always ensure you have the correct citation, even if you rearrange the order of the bibliography or add in other references. To reference the book in the bibliography use [3], or the article by [2]. You can use anything you wish for the reference names.

References

[1] Authors,“Article Title”, pp. 473-480, Date.

[2] Authors. “Article Titles.” journal pages...

[3] Authors. **Title of Book**. Publisher...