

First document: *Lorem Ipsum**

Gabriel Alves Vieira (gavieira)
Contact: gabrieldeusdeth@gmail.com

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*This template would not be completed without the [Overleaf](#) L^AT_EX editor and tutorials (from which a great part of this document has been ripped)

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Lorem Ipsum

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.

1 What is Lorem Ipsum?

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.



Figura 1: *Lorem ipsum* is part of pop culture

2 Where does it come from?

Contrary to popular belief, Lorem Ipsum is not simply random text. It has roots in a piece of classical Latin literature from 45 BC, making it over 2000 years old. Richard McClintock, a Latin professor at Hampden-Sydney College in Virginia, looked up one of the more obscure Latin words, *consectetur*, from a Lorem Ipsum passage, and going through the cites of the word in classical literature, discovered the undoubtable source. Lorem Ipsum comes from sections 1.10.32 and 1.10.33 of "de Finibus Bonorum et Malorum" (The Extremes of Good and Evil) by Cicero, written in 45 BC. This book is a treatise on the theory of ethics, very popular during the Renaissance. The first line of Lorem Ipsum, "Lorem ipsum dolor sit amet..", comes from a line in section 1.10.32.

The standard chunk of Lorem Ipsum used since the 1500s is reproduced below for those interested. Sections 1.10.32 and 1.10.33 from "de Finibus Bonorum et Malorum" by Cicero

are also reproduced in their exact original form, accompanied by English versions from the 1914 translation by H. Rackham.

3 Why do we use it?

It is a long established fact that a reader will be distracted by the readable content of a page when looking at its layout. The point of using Lorem Ipsum is that it has a more-or-less normal dis-

tribution of letters, as opposed to using 'Content here, content here', making it look like readable English. Many desktop publishing packages and web page editors now use Lorem Ipsum as their default model text, and a search for 'lorem ipsum' will uncover many web sites still in their infancy. Various versions have evolved over the years (Figure 2), sometimes by accident, sometimes on purpose (injected humour and the like).



Figura 2: There are variants of *Lorem ipsum*

4 Where can I get some?

There are many variations of passages of Lorem Ipsum available, but the majority have suffered alteration in some form, by injected humour, or randomised words which don't look even slightly believable. If you are going to use a passage of Lorem Ipsum, you need to be sure there isn't anything embarrassing hidden in the middle of text. All the Lorem Ipsum generators on the Internet tend to repeat predefined chunks as necessary, making this the first true generator on the Internet.

It uses a dictionary of over 200 Latin words, combined with a handful of model sentence structures, to generate Lorem Ipsum which looks reasonable. The generated Lorem Ipsum is therefore always free from repetition, injected humour, or non-characteristic words etc.

5 Basic L^AT_EX!

5.1 Images

5.1.1 Adding Images

We will now look at how to add images to a LATEX document. On Overleaf, you will first have to [upload the images](#).

Below is a example on how to include a picture:

```
\documentclass{article}
\usepackage{graphicx}
\graphicspath{ {images/} }

    The universe is immense and it seems to be homogeneous,
    in a large scale, everywhere we look at.

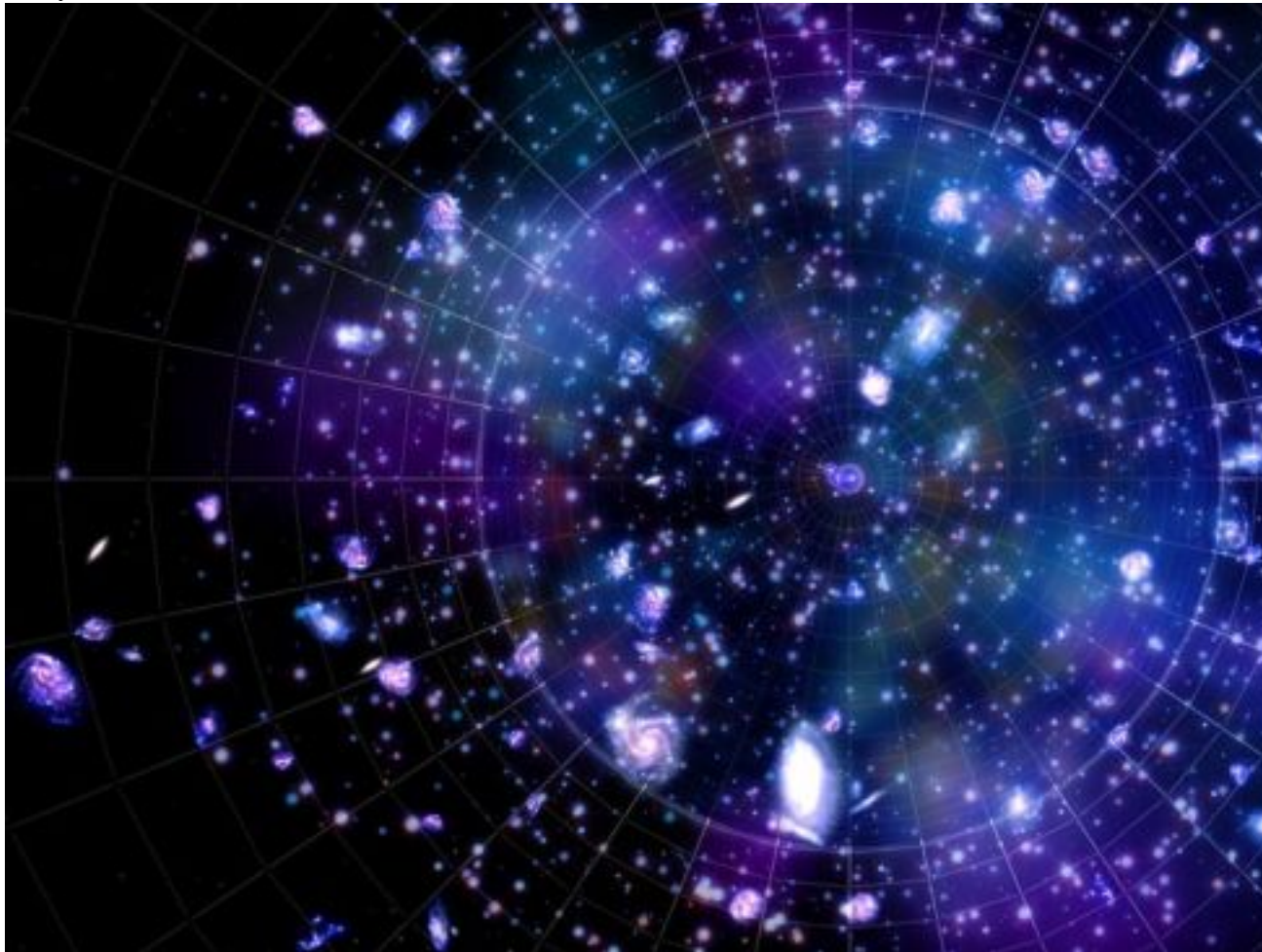
    \includegraphics{universe}

    There's a picture of a galaxy above

\end{document}
```

Which outputs the following:

The universe is immense and it seems to be homogeneous, in a large scale,
everywhere we look at.



There's a picture of a galaxy above

L^AT_EX can not manage images by itself, so you will need to use a package. Packages can be used to change the default look of your L^AT_EX document, or to allow more functionalities. In this case, you need to include an image in our document, so you should use the `graphicx` package. This package gives new commands, `\includegraphics{...}` and `\graphicspath{...}`. To use the `graphicx` package, include the following line in your preamble: `\usepackage{graphicx}`

The command `\graphicspath{ {images/} }` tells L^AT_EX that the images are kept in a folder named `images` under the current directory. The `\includegraphics{universe}` command is the one that actually included the image in the document. Here `universe` is the name of the file containing the image without the extension, then `universe.PNG` becomes `universe`. The file name of the image should not contain white spaces nor multiple dots¹

5.1.2 Captions, Labels and References

Images can be captioned, labelled and referenced by means of the figure environment as shown below:

¹The file extension is allowed to be included, but it's a good idea to omit it. If the file extension is omitted it will prompt L^AT_EX to search for all the supported formats. It is also usually recommended to use lowercase letters for the file extension when uploading image files. For more details see the section about [generating high resolution and low resolution images](#).

Below is a example on how to include a picture:

```
\begin{figure}[H]
  \centering
  \includegraphics[width=0.25\textwidth]{mesh}
  \caption{a nice plot}
  \label{fig:mesh1}
\end{figure}
```

As you can see in the figure `\ref{fig:plot1}`, the function grows near 0. Also, in the page `\pageref{fig:plot1}` is the same example.



Figura 3: a nice plot

As you can see in the figure [3](#), the function grows near 0. Also, in the page [9](#) is the same example.

There are three important commands in the example:

- `\caption{a nice plot}`: As you may expect this command sets the caption for the figure. If you create a list of figures this caption will be used there. You can place it above or below the figure.
- `\label{fig:mesh1}`: If you need to refer the image within your document, set a label with this command. The label will number the image, and combined with the next command will allow you to reference it.
- `\ref{fig:mesh1}`: This code will be substituted by the number corresponding to the referenced figure.

When placing images in a LATEX document, we should always put them inside a figure environment or similar so that LATEX will position the image in a

way that fits in with the rest of your text².

5.2 Lists

Lists are very simple to create in LaTeX. You can create lists using different list environments. Environments are sections of our document that you want to present in a different way to the rest of the document. They start with a `\begin{...}` command and end with an `\end{...}` command.

5.2.1 Unordered Lists

Unordered lists are produced by the **itemize** environment:

```
\begin{itemize}
\item The individual entries are indicated with a black dot a so-
      called bullet.
\item The text in the entries may be of any length.
\end{itemize}
```

For instance:

Compras:

- Arroz
- Feijão
- Temperos
 - Açafrão
 - Páprica
 - Louro
 - Sal do Himalaia
 - Canela

²If you are using captions and references on your own computer, you will have to compile the document twice for the references to work. Overleaf will do this for you automatically

Sonhos:

- Casa própria
- Emprego estável
 - Bioinformata
 - Developer
 - Data scientist
- PC gamer

5.2.2 Ordered Lists

Ordered list have the same syntax inside a different environment. We make ordered lists using the enumerate environment:

```
\begin{enumerate}  
  \item This is the first entry in our list  
  \item The list numbers increase with each entry we add  
\end{enumerate}
```

For instance:

Manhã

1. Levantar da cama
2. Tomar banho
3. Tomar café
4. Escovar os dentes
5. Sair para o trabalho

5.3 Math

One of the main advantages of \LaTeX is the ease at which mathematical expressions can be written. \LaTeX allows two writing modes for mathematical expressions: the **inline** mode and the **display** mode. The first one is used to write formulas that are part of a text. The second one is used to write expressions that are not part of a text or paragraph, and are therefore put on separate lines.

5.3.1 Inline Mode

To put your equations in **inline** mode use one of these delimiters: `\(... \)`, `$... $` or `\begin{math} ... \end{math}`. They all work and the choice is a matter of taste.

Example: To output Einstein's mass energy equivalence ($E = mc^2$) as inline text, you need to write it as `$E=mc^2$`.

5.3.2 Displayed Mode

The **displayed** mode has two versions: numbered and unnumbered. Take the following \LaTeX code³:

```
The mass-energy equivalence is described by the famous equation

\[ E=mc^2 \]

discovered in 1905 by Albert Einstein.
In natural units ( $c = 1$ ), the formula expresses the identity

\begin{equation}
E=m
\end{equation}
```

³*equation** environment is provided by an external package, consult the [amsmath article](#). Since many math mode commands require this package, be sure to include it when writing math.

Which will generate the following text when interpreted by \LaTeX :

The mass-energy equivalence is described by the famous equation

$$E = mc^2$$

discovered in 1905 by Albert Einstein. In natural units ($c = 1$), the formula expresses the identity

$$E = m \tag{1}$$

The possibilities with math in \LaTeX are endless and it is impossible to list them all here. Check the [Overleaf tutorial](#) for a list of other articles on \LaTeX math packages and formatting.

5.4 Basic Formatting

5.4.1 Abstracts

In scientific documents it's a common practice to include a brief overview of the main subject of the paper. In \LaTeX there's the `abstract` environment for this. The `abstract` environment will put the text in a special format at the top of your document.

Resumo

This is an abstract. Normally, it introduces the main topic of the study, its methods, results and conclusions in a very concise, not referenced way.

When writing the contents of your document, if you need to start a new paragraph you must hit the "Enter" key twice (to insert a double blank line). Notice that \LaTeX automatically indents paragraphs.

To start a new line without actually starting a new paragraph insert a break line point, this can be done by `\\` (a double backslash as in the example) or the `\newline` command.

Care should be taken that multiple `\\` or `\newlines` are not used to "simulate" paragraphs with larger spacing between them, as this can interfere with \LaTeX 's typesetting algorithms. The recommended method to do so is to keep using double blank lines to create new paragraphs without any `\\`, and then add `\usepackage{parskip}` to the preamble. You can find more information in the [Paragraphs and new lines](#) subsection.

5.5 Chapters and Sections

Commands to organize a document vary depending on the document type, the simplest form of organization is the sectioning, available in all formats. Example of this can be seen in the code below:

```
\chapter{First Chapter}

\section{Introduction}

This is the first section.

Lorem ipsum dolor sit amet, consectetur adipiscing
elit. Etiam lobortis facilisis sem. Nullam nec mi et
neque pharetra sollicitudin. Praesent imperdiet mi nec ante.
Donec ullamcorper, felis non sodales...

\section{Second Section}

Lorem ipsum dolor sit amet, consectetur adipiscing elit.
Etiam lobortis facilisissem. Nullam nec mi et neque pharetra
sollicitudin. Praesent imperdiet mi nec ante...

\subsection{First Subsection}
Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales
...

\section*{Unnumbered Section}
Lorem ipsum dolor sit amet, consectetur adipiscing elit.
Etiam lobortis facilisissem
```

The command `\section{}` marks the beginning of a new section, inside the braces is set the title. Section numbering is automatic and can be disabled by including a `*` in the section command as `\section*{}`. We can also have `\subsection{}`s, and indeed `\subsubsection{}`s.

The basic levels of depth are listed below:

1. `\part{part}`
2. `\chapter{chapter}`
3. `\section{section}`
4. `\subsection{subsection}`
5. `\subsubsection{subsubsection}`
6. `\paragraph{paragraph}`
7. `\subparagraph{subparagraph}`

Note that `\part` and `\chapter` are only available in report and book document classes.

5.6 Creating Tables

5.6.1 Creating a simple table in \LaTeX

Below you can see the simplest working example of a table:

```
\begin{center}
\begin{tabular}{c c c }
cell1 & cell2 & cell3 \\
cell4 & cell5 & cell6 \\
cell7 & cell8 & cell9
\end{tabular}
\end{center}
```

That will render the following:

cell1	cell2	cell3
cell4	cell5	cell6
cell7	cell8	cell9

The tabular environment is the default LaTeX method to create tables. You must specify a parameter to this environment, in this case `c c c`. This tells LaTeX that there will be three columns and that the text inside each one of them must be centred. You can also use `r` to align the text to the right and `l` for left alignment. The alignment symbol `&` is used to specify the breaks in the table entries. There must always be one less alignment symbol in each line than the number of columns. To go to the next line of your table, we use the new line command `\\`. We wrap the entire table inside the center environment so that it will appear in the center of the page.

5.6.2 Adding Borders

The tabular environment is more flexible, you can put separator lines in between each column:

```
\begin{center}
\begin{tabular}{|c|c|c|}
\hline
cell1 & cell2 & cell3 \\
cell4 & cell5 & cell6 \\
cell7 & cell8 & cell9 \\
\hline
\end{tabular}
\end{center}
```

cell1	cell2	cell3
cell4	cell5	cell6
cell7	cell8	cell9

You can add borders using the horizontal line command `\hline` and the vertical line parameter `|`.

- `|c|c|c|`: This declares that three columns, separated by a vertical line, are going to be used in the table. The `|` symbol specifies that these columns should be separated by a vertical line.
- `\hline`: This will insert a horizontal line. We have included horizontal lines at the top and bottom of the table here. There is no restriction on the number of times you can use `\hline`.

Below you can see a second example:

```
\begin{center}
\begin{tabular}{||c c c c||}
\hline
Col1 & Col2 & Col2 & Col3 \\ \ [0.5ex]
\hline\hline
1 & 6 & 87837 & 787 \\
\hline
2 & 7 & 78 & 5415 \\
\hline
3 & 545 & 778 & 7507 \\
\hline
4 & 545 & 18744 & 7560 \\
\hline
5 & 88 & 788 & 6344 \\ \ [1ex]
\hline
\end{tabular}
\end{center}
```

Col1	Col2	Col2	Col3
1	6	87837	787
2	7	78	5415
3	545	778	7507
4	545	18744	7560
5	88	788	6344

Creating tables in LaTeX can be a bit tricky sometimes, so you may want to use the [TablesGenerator.com](https://www.tablesgenerator.com) online tool to export LaTeX code for tabulars. The File - Paste table data option lets you copy and paste data from spreadsheet applications.

5.6.3 Captions, labels and references

You can caption and reference tables in much the same way as images. The only difference is that instead of the figure environment, you use the table environment.

For instance...

Table `\ref{table:data}` is an example of referenced `\LaTeX{}` elements.

```
\begin{table}[h!]  
\centering  
\begin{tabular}{||c c c c||}  
\hline  
Col1 & Col2 & Col2 & Col3 \\\ [0.5ex]  
\hline\hline  
1 & 6 & 87837 & 787 \\  
2 & 7 & 78 & 5415 \\  
3 & 545 & 778 & 7507 \\  
4 & 545 & 18744 & 7560 \\  
5 & 88 & 788 & 6344 \\\ [1ex]  
\hline  
\end{tabular}  
\caption{Table to test captions and labels}  
\label{table:data}  
\end{table}
```

Table 1 is an example of referenced `\LaTeX` elements⁴

Col1	Col2	Col2	Col3
1	6	87837	787
2	7	78	5415
3	545	778	7507
4	545	18744	7560
5	88	788	6344

Tabela 1: Table to test captions and labels

5.6.4 The next thing...

⁴If you are using captions and references on your own computer, you will have to compile the document twice for the references to work. Overleaf will do this for you automatically.

5.7 Paragraphs and new lines - unfinished

This subsection will eventually be written

5.7.1 Citation - unfinished

This subsection will eventually be written