

# Introductory L<sup>A</sup>T<sub>E</sub>X Lab

Maxime CHUPIN

November 4, 2025

**Tip:** Most exercises can be done in the same working document. You can start a new section (`\section{...}`) for each exercise.

**Exercise 1 (Getting started with T<sub>E</sub>Xstudio) :** Using the T<sub>E</sub>Xstudio editor, create your first document in a working directory. Use the preamble presented in class. Compile and view the document.

**Exercise 2 (Discovering title commands) :** At the end of your preamble (i.e. just before `\begin{document}`), fill in the arguments of the following commands:

---

```
% preamble
\title{...}
\author{...}
```

---

Then, just below `\begin{document}`, add the command without arguments: `\maketitle`. Compile and observe the result.

**Exercise 3** From your current document, add sections `\section{...}`, subsections `\subsection{...}`, and paragraphs `\paragraph{...}`, etc., then generate a table of contents with `\tableofcontents`.

**Exercise 4 (Understanding how commands work) :** Look at and try to understand the difference between the three following sentences:

---

```
\LaTeX allows us to typeset beautiful paragraphs.
```

```
\LaTeX{} allows us to typeset beautiful paragraphs.
```

---

**Exercise 5 (Lists) :** Using the environments `itemize` and `enumerate`, produce the following output:

- Nested lists:
  1. Numbered items
  2. with even sub-numbering
    - (a) one element;
    - (b) second element;

- an unnumbered element.

**Exercise 6 (Special characters) :** Find the code that produces the following result:  
Camille & Guérin won 300 \$ with an investment yielding 7.5%. What was their initial capital?

**Exercise 7 (Text styles) :** How can you obtain:

- You must *recognize all the variations*
- You must **recognize all the variations**

Observe the result of the following source code:

---

```
\begin{center}
Let's see the effect of a \emph{very useful} command.
\end{center}
```

```
\begin{center}\itshape
Let's see the effect of a \emph{very useful} command.
\end{center}
```

---

**Exercise 8 (A bit of math) :** Typeset the following examples:

- $12 \div 3 = 4$  also means  $3 \times 4 = 12$ .
- The equality  $x = 2y$  is equivalent to  $y = x/2$ .
- The equality  $x = 2y$  is equivalent to  $y = \frac{1}{2}x$ .
- The function that maps  $x$  to  $x^2$  is differentiable.
- Consider the function  $f$  defined on  $\mathbf{R}$  by:

$$f : x \mapsto e^{2x+1}$$

If you wish to write the set of real numbers in the *blackboard* style, you need to load the package `amssymb`.

- 
- In the coordinate system  $(O; \vec{i}; \vec{j})$ , the subspaces  $\mathcal{F}$  and  $\mathcal{G}$  satisfy  $\forall (\vec{u}, \vec{v}) \in \mathcal{F} \times \mathcal{G}, \vec{u} \cdot \vec{v} = 0$ .
- 

$$\frac{\sqrt{x+1}}{y+1} \neq \sqrt{\frac{x+1}{y+1}} \tag{1}$$

**Exercise 9 (Cross-references) :** Create a multi-page document (using the previous examples and one section per exercise should suffice). Add some `\label{}` commands and refer to them with `\ref` and `\pageref`.

**Exercise 10 (A bit of math (II)) :** Typeset the following examples:

- $\sin \frac{\pi}{2} = 1$ .

- 

$$\sum_{i,j \in I \times J} i + j = \sum_{i \in I} \left( \sum_{j \in J} i + j \right)$$

- 

$$\sum_{k \text{ odd}} \frac{1}{k}$$

- 

$$a^n = \overbrace{a \times a \times \cdots \times a}^{n \text{ times}}$$

- Using the `\stackrel` command:

$$f(x) \stackrel{\text{def.}}{=} x^2$$

- Using the `array` environment:

$$f : \begin{array}{l} \mathbf{R} \rightarrow \mathbf{R} \\ x \mapsto e^x \end{array}$$

- 

$$\left[ \begin{array}{cc} \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} & \begin{pmatrix} a & b \\ c & d \end{pmatrix} \\ \text{Id} & 0_{\mathcal{M}_2(\mathbf{R})} \end{array} \right] \quad (2)$$

**Exercise 11 (Bibliography: searching entries and creating the .bib file) :**

1. Search on the website `mathscinet.ams.org`, and retrieve the following Bib $\TeX$  entries to store in a `.bib` file:
  - BOURBAKI, N., *Elements of Mathematics. Algebra. Chapter 8. Modules and Semi-Simple Rings.*
  - LAGRANGE, Joseph-Louis, *Analytical Mechanics. Volume 1.*
  - POINCARÉ, Henri, *Review of Hilbert's Foundations of Geometry. Real Numbers, Generalizations of the Reals, and Theories of Continua.*
2. After loading the `biblatex` package and specifying your bibliography file with `\bibliography{...}`, cite the three works.
3. Place `\printbibliography` at the end of your document.
4. Perform the required compilation steps to generate the bibliography in your document.
5. Get familiar with citation commands and the `biblatex` package by reading its documentation.

**Exercise 12 (figure environment) :** Find a royalty-free image online and include it in a `figure` environment. You should also reference it. The template is as follows:

---

```
\begin{figure}[<options>]
  \centering
  \includegraphics[width=<value>]{imagefile}
  \caption{...}
  \label{...}
\end{figure}
```

---

**Exercise 13 (Tables) :** Reproduce the following table, using the `p` column type for the second column:

<b>Body</b>	<b>Comment</b>	<b>Diameter (km)</b>	<b>Density</b>
Sun	A fairly ordinary star.	1392000	1.409
Mercury	It is very hot.	4840	5.50
Venus	Often called the “twin” of the Earth. It is also the morning star.	12390	5.25

Include this table in a `table` environment as in the previous exercise, and reference it.