

Day 01: Intro to L^AT_EX



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L^AT_EX101

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Introduction

Course Background

What is L^AT_EX?

Document Structure

Logical structure

Document Classes

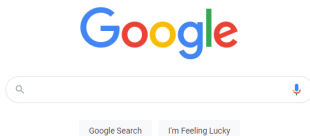
Packages and Definitions

Introduction

Course Background, What is L^AT_EX?

- ▶ **Inspiration** – <https://www.learnlatex.org/>.
 - ▶ Day 1 – [learnlatex.org](https://www.learnlatex.org/) lessons 1-6.
 - ▶ Day 2 – [learnlatex.org](https://www.learnlatex.org/) lessons 7-12.
 - ▶ Day 3 – Inkscape for graphics with embedded L^AT_EX. Specific templates (resume, presentations).
- ▶ **Slides Available** – <https://github.com/mdelrosa/latex-101>.
 - ▶ Template based on Clara Pavillet's Oxford Template
- ▶ **Slack back channel**
 - ▶ UC Davis Slack channel

Markup Language – Instructions for rendering a document.



```
<html itemscope itemtype="http://schema.org/webPage" lang="en">
<head>
</head>
<body jsmodel="TVh0oe" jsaction="YUC7Hei:CLIENT;IVKTFe:CLIENT;HJCe1d:CLIENT;K
JmH:CLIENT;u0T0m:CLIENT;xjHTF:CLIENT;J0zyse:CLIENT;E7WMe:CLIENT;Jqf0m:
CLIENT;pe3ike:CLIENT;IrNw0e:CLIENT;2943H:CLIENT;AD7W0d:CLIENT;YCF3:CLIENT;
ASQDe:CLIENT;1VE3d:CLIENT;VM8g:CLIENT;Nw93b:CLIENT;McUWe:CLIENT;NT3od
f:CLIENT;u7J0N:CLIENT;PV13f:CLIENT;u0TPd:CLIENT;JL9Qdc:CLIENT;KwJxhc:CLI
ENT;gMTEf:CLIENT;vP83b:CLIENT">
<!-- E0 -->
<style data-mml="1629207776313"></style>
<div class="L8eUp" data-head="1"></div>
<div class="FevqJc"></div>
<textarea class="csi" name="csi" style="display:none"></textarea>
<script nonce="1XuxLC1Scpf0R2BkvNT6Q=="></script>
<script src="/xjs/_/js/k=xjs.s.en_US.BRDYK2ua1Ho.O/ck=xjs.s.IgF8gK1_Sa1.L.W.
O/emQic,V,1ia57b,aa,abd,esync,dvi,fK2ehd,if1,mu,ptGhd,sh_wiz,sf,sonic,spch7xj
s=1" nonce="1XuxLC1Scpf0R2BkvNT6Q==" async"></script>
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y: none;"></div>
<div class="gb_Fd">Google apps</div>
<script src="/xjs/_/js/k=xjs.s.en_US.BRDYK2ua1Ho.O/ck=xjs.s.IgF8gK1_Sa1.L.W.
O/emQic,spch/ed=1/dg=2/rs=ACT90fsh5SXTzuy6zUSI-TVYB0_E-CdaA/mwL1Qz7K3js=
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<script src="/xjs/_/js/k=xjs.s.en_US.BRDYK2ua1Ho.O/ck=xjs.s.IgF8gK1_Sa1.L.W.
O/emQic,spch/ed=1/dg=2/rs=ACT90fsh5SXTzuy6zUSI-TVYB0_E-CdaA/mwL1Qz7K3js=
2" nonce="1XuxLC1Scpf0R2BkvNT6Q==" async gapl_processed="true"></script>
</body>
</html>
```

Figure 1: Example – HTML for websites

L^AT_EX– Markup language for academic documents (e.g., publications, presentations, lecture notes, assignments).

```
\begin{frame}{What is \LaTeX?}
\LaTeX -- Markup language for academic documents (e.g., publications, presentations, lecture notes, assignments).
\begin{figure}
\includegraphics[width=0.8\linewidth]{latex_example.png}
\caption{Example -- \LaTeX \; snippet for this slide.}
\label{fig:latex}
\end{figure}
\end{frame}
```

Figure 2: Example – L^AT_EX snippet for this slide.

$$V_s = \int_{-R}^R \pi(R^2 - x^2)dx = \frac{4}{3}\pi R^3 \quad (1)$$

```
\begin{equation}
V_s = \int_{-R}^R \pi (R^2 - x^2) dx = \frac{4}{3}\pi R^3 \label{eq:sphere}
\end{equation}
```

Figure 3: Example – L^AT_EX snippet for this equation.

Enables rich cross-referencing of equations, figures, tables

- ▶ Equation 1 (previous page)
- ▶ Table 1

Feature	Support
Figures	Yes!
Equations	Yes!
Tables	Yes!
Bibliographies	Yes!

Table 1: A simple table.

Two primary components/steps:

1. Write your L^AT_EX file(s) (**Text editor**)
2. “Compile” or “Typeset” your document (**L^AT_EX system**)



Figure 4: Text editors (Notepad, Notepad++, Sublime Text) and LaTeX distributions (MikTeX, TeXLive, and TeX Studio)

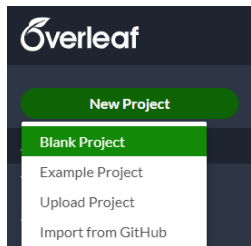
- ▶ Editors/systems installed on local device (faster, private)

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- ▶ Editor/systems online (convenient, collaborative)

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- ▶ Editor/systems online (convenient, collaborative)
- ▶ Will use **Overleaf** for this course (free account required)



1. Make an Overleaf account (free!)
2. Go to <https://www.overleaf.com/project>
3. Create a blank project and pick a project name



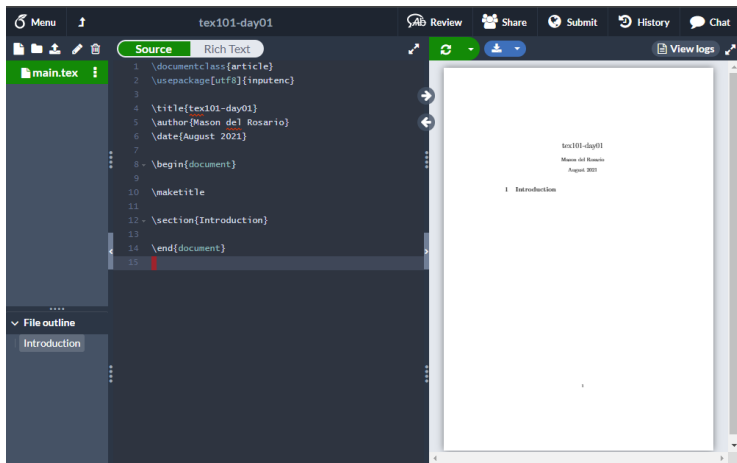


Figure 5: Result of creating new project on Overleaf

Document Structure

Commands, Environments, Errors

L^AT_EX has special characters to define commands and arguments.

- ▶ Backslashes (\) = start of a commands
- ▶ Curly brackets ({ }) = mandatory arguments (i.e., inputs to commands)
- ▶ Square brackets ([]) = optional arguments

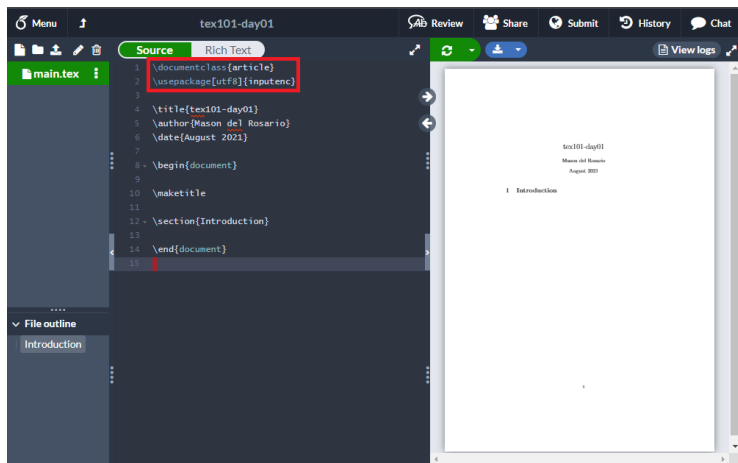


Figure 6: Commands/arguments defining the document class and text encoding of our project.

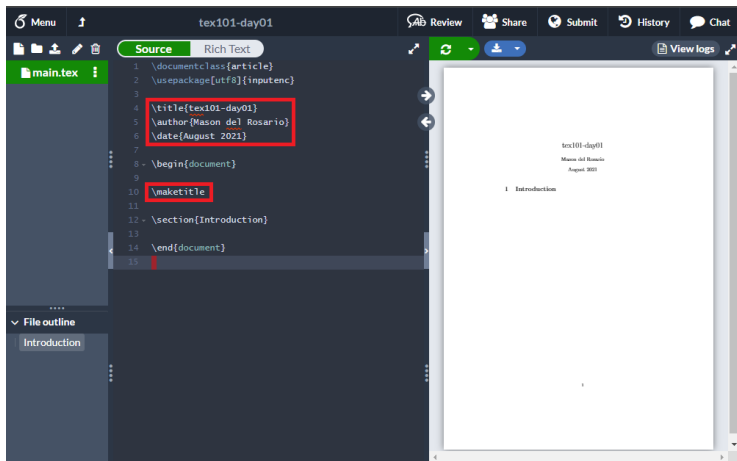


Figure 7: Commands/arguments defining the title in our project.

Environments = `\begin{...}` and `\end{...}` commands.

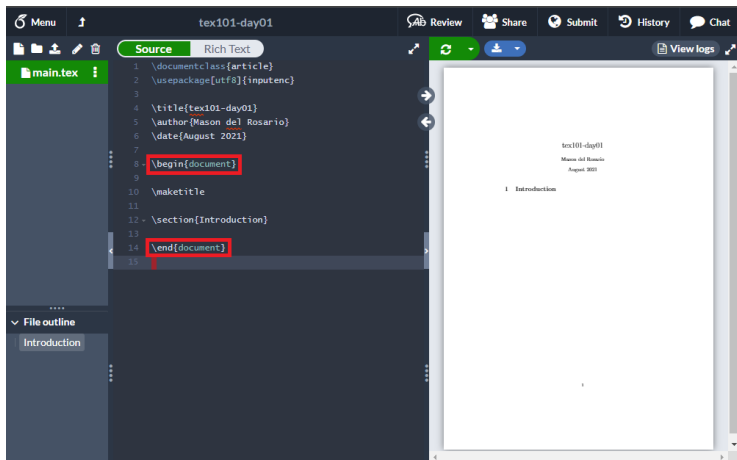


Figure 8: Every L^AT_EX file includes a document environment.

Lots of different environments! Will go over more in this course.

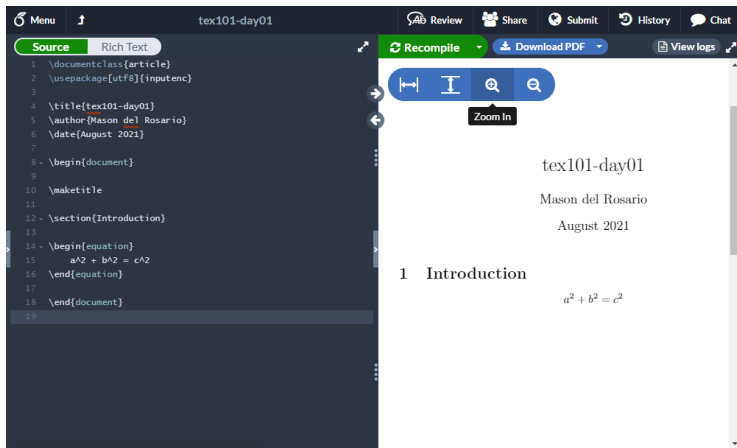


Figure 9: Try writing an equation environment!

- ▶ What happens when we mess up?
- ▶ Remove the `\end{equation}` command, compile the document.

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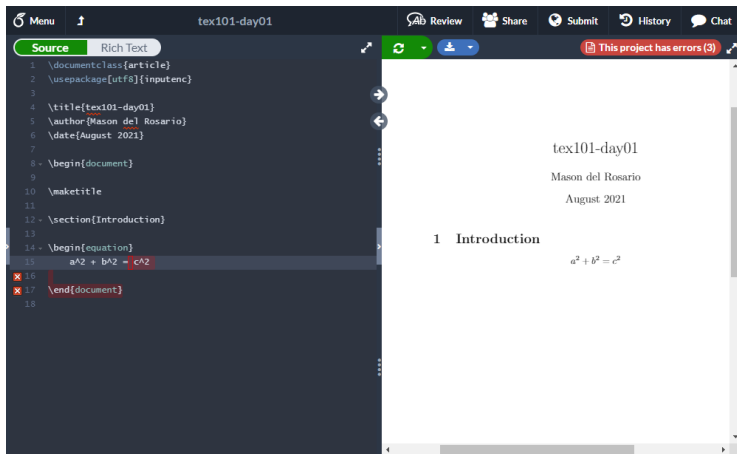


Figure 10: Click on the red badge to reveal more details.

Some errors might be sneakier. Google is your friend!

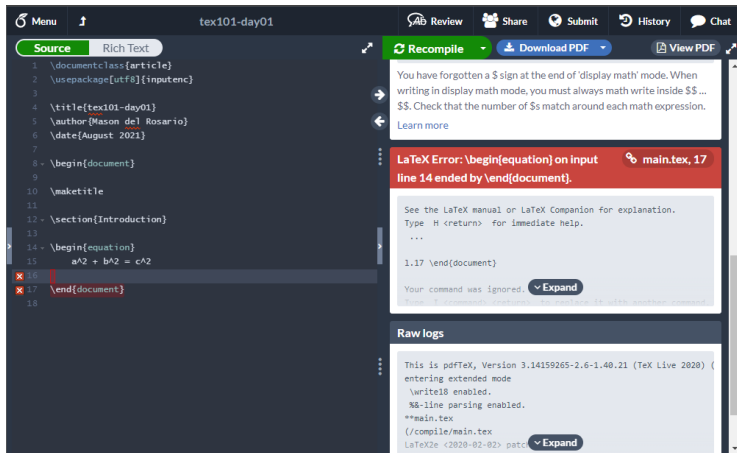


Figure 11: Compiler has returned an **error**.

- ▶ Try adding text to your first document, typesetting and seeing the changes in your PDF.
- ▶ Make some different paragraphs and add variable spaces.
- ▶ Explore how your editor works; click on your source and find how to go to the same line in your PDF.
- ▶ Share your observations/questions in chat!

Logical structure

Text formatting, sectioning, lists

Some common commands for formatting text:

- ▶ `\textbf`: **Make text boldface.**
- ▶ `\textit`: *Make text italic.*
- ▶ `\underline`: Underline text.
- ▶ `\texttt`: Make text resemble typewriter.
- ▶ And so many more! For example, see <https://latex-tutorial.com/changing-font-style/>.

L^AT_EX provides commands to generate section/subsection headings.

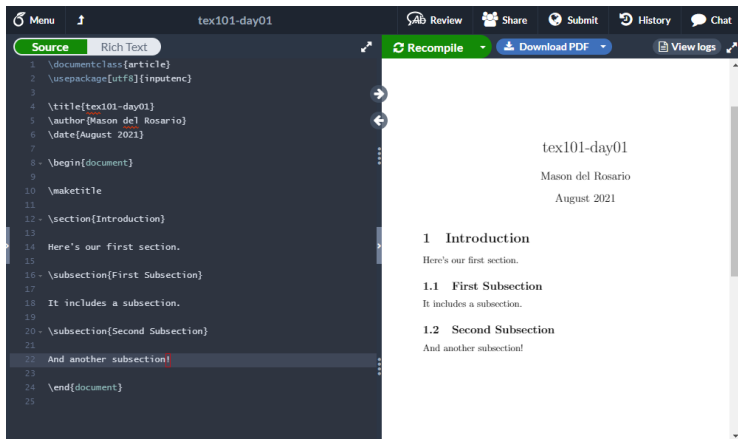


Figure 12: Numbers for different (sub)sections are automatically generated.

Different section levels available:

- ▶ `\chapter` (for `\documentclass{book}`,
`\documentclass{report}`)
- ▶ `\section`
- ▶ `\subsection`
- ▶ `\subsubsection`
- ▶ `\paragraph` (rarely used!)

Lists in \LaTeX can be unordered or ordered:

- | | |
|-------------------------|------------------------|
| ▶ First unordered item | 1. First ordered item |
| ▶ Second unordered item | 2. Second ordered item |
| ▶ Third unordered item | 3. Third ordered item |

List commands: `itemize/enumerate` environments + `\item` commands per each line.

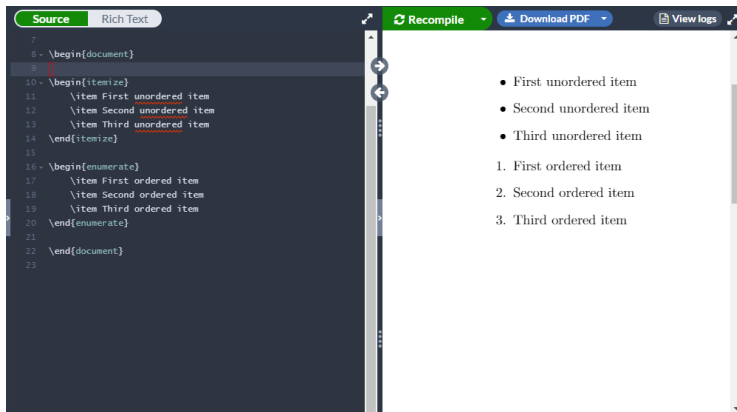


Figure 13: Numbers for different (sub)sections are automatically generated.

- ▶ Experiment with different sectioning levels. Try using `\documentclass{report}` instead of `\documentclass{article}` and adding `\chapter` commands. How do they look?
- ▶ Try out `\paragraph` and (even) `\subparagraph` to see they work: by default, they don't add numbers.
- ▶ Make some lists, and nest one list inside another. How does the format of the numbers or markers change? You can only go to four levels with standard L^AT_EX, but more than four nested lists tends to be a bad sign anyway!

Document Classes

Base classes, function-rich classes(?), presentations

Controls general layout of document, changing:

- ▶ Design (margins, fonts, spacing, etc.)
- ▶ Sectioning (e.g., `\chapter`)
- ▶ Title location (top of page vs. separate page)
- ▶ Add new commands (e.g., frame environments for slides)

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Can manually set global options (i.e.,
`\documentclass[<options>]{<name>}`).

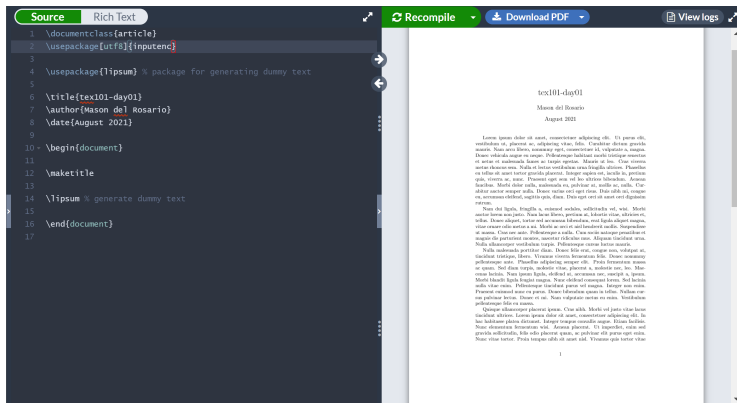


Figure 14: Our starter project is an article class.

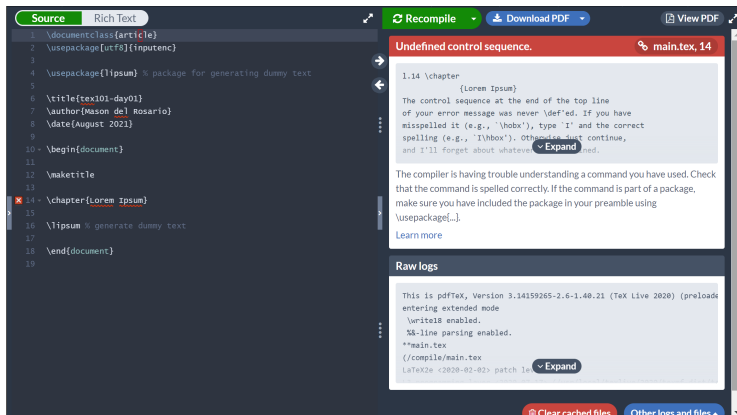


Figure 15: Adding a `\chapter` section causes an error.

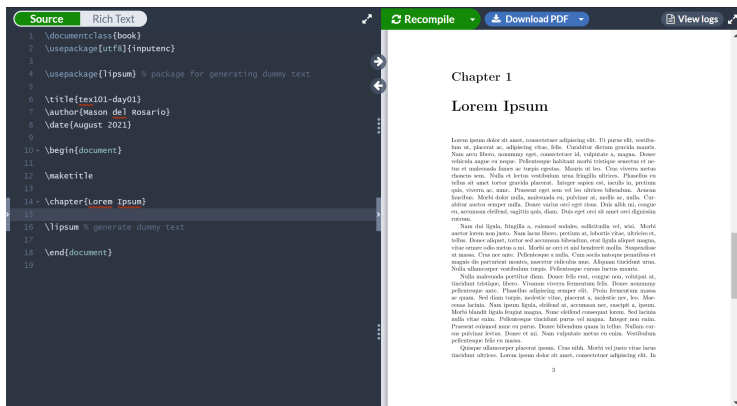


Figure 16: Changing to `\documentclass{book}` enables `\chapter`.

Default `\documentclasses` provided by L^AT_EX:

- ▶ `article` - short documents without chapters
- ▶ `report` - longer documents with chapters, single-sided printing
- ▶ `book` - longer documents with chapters, double-sided printing, front-/back-matter (e.g., index)
- ▶ `letter` - correspondence with no sections
- ▶ `slides` - for presentations (not used in practice; will explain!)

- ▶ Explore changing the document class between base classes, the KOMA bundle and memoir. How do these affect the appearance of the document?
- ▶ Using the square brackets (`[]`), add the option `twocolumn`. How does this affect the layout of the document?

Packages and Definitions

Packages and definitions

Base L^AT_EX doesn't do everything. Packages add more functionality, including:

- ▶ Change how parts of L^AT_EX work
- ▶ Add new commands (e.g. `\lipsum` package for filler text)
- ▶ Change document design

Example: babel – rule sets for different languages.

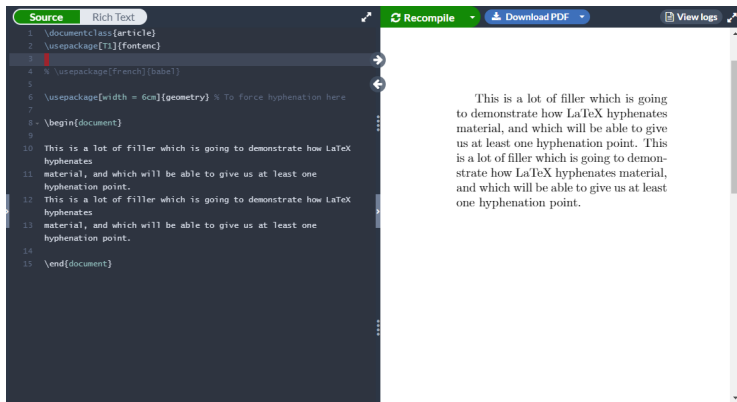


Figure 17: babel package with french option changes hyphenation.

Example: babel – rule sets for different languages.

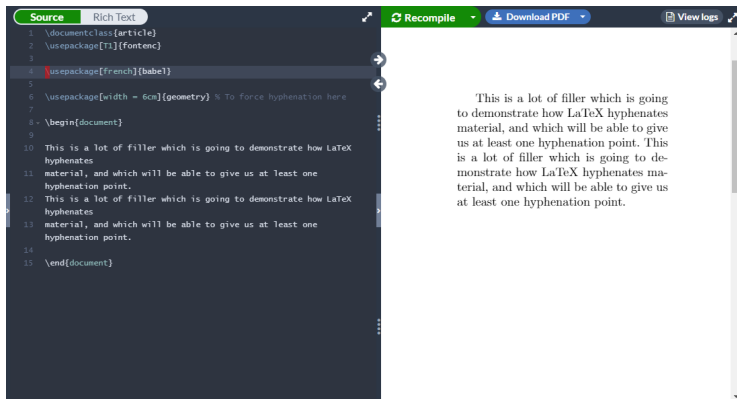


Figure 18: `babel` package with `french` option changes hyphenation.

Example: geometry – enables direct control of margins, borders, line spacing, etc.

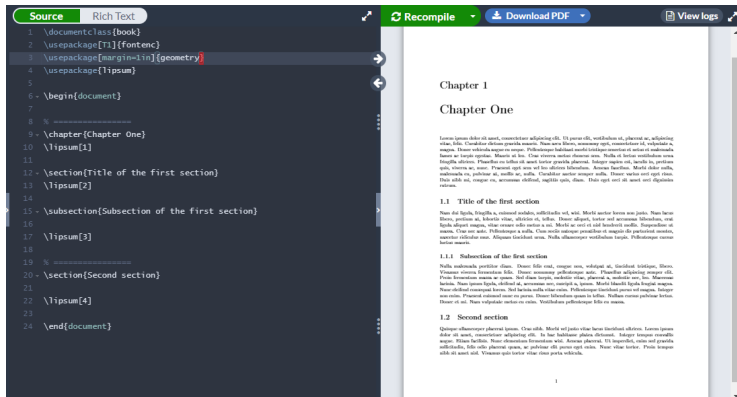


Figure 19: geometry package with 1" page margins.

Example: geometry – enables direct control of margins, borders, line spacing, etc.

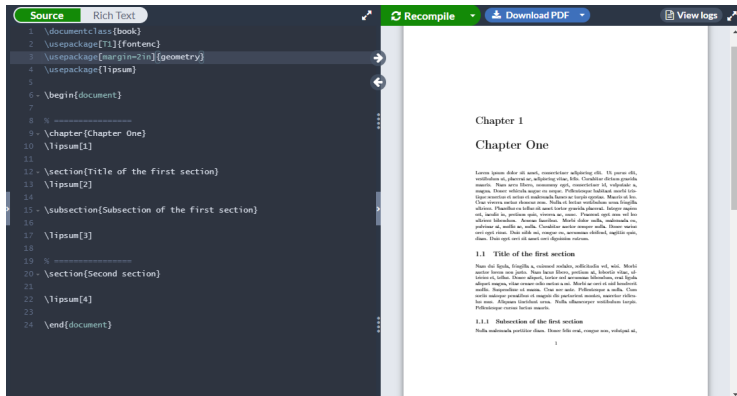


Figure 20: geometry package with 2" page margins.

Can't find a command you want? Want to avoid repeating yourself?

Use definitions to define your own commands!

Line 6 `\newcommand` defines a `\kw` command.

- ▶ `\newcommand\kw` → assign `kw` as command name
- ▶ `[1]` → number of arguments
- ▶ `#1` → first argument supplied to command

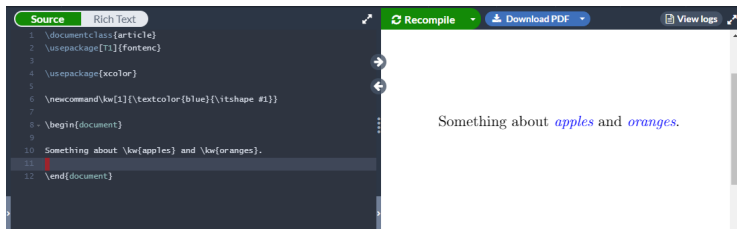


Figure 21: A definition for a custom ‘keyword’ command `\kw`.

- ▶ Finished Lessons 1-8 from `learnlatex.org`
- ▶ Tomorrow: Lessons 9-16 from `learnlatex.org`
- ▶ Questions? Ask on the Slack channel! (`#latex101`)