Latex Reference Document
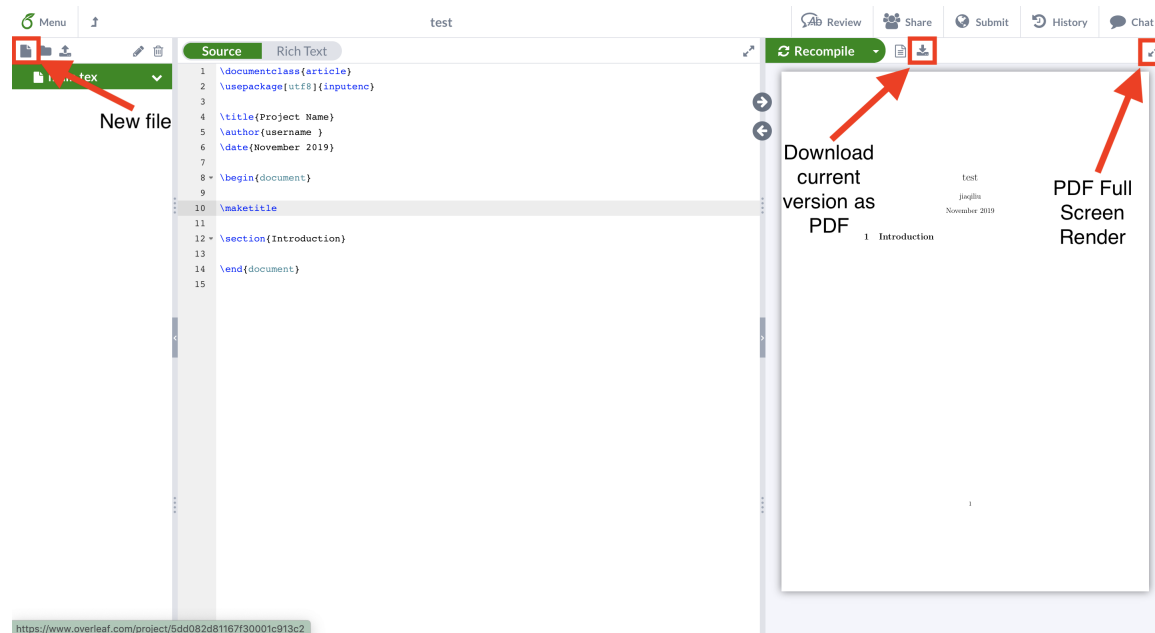
Contents

1 Creating a Document

Upon logging into the main screen, the following will appear with your list of existing projects:
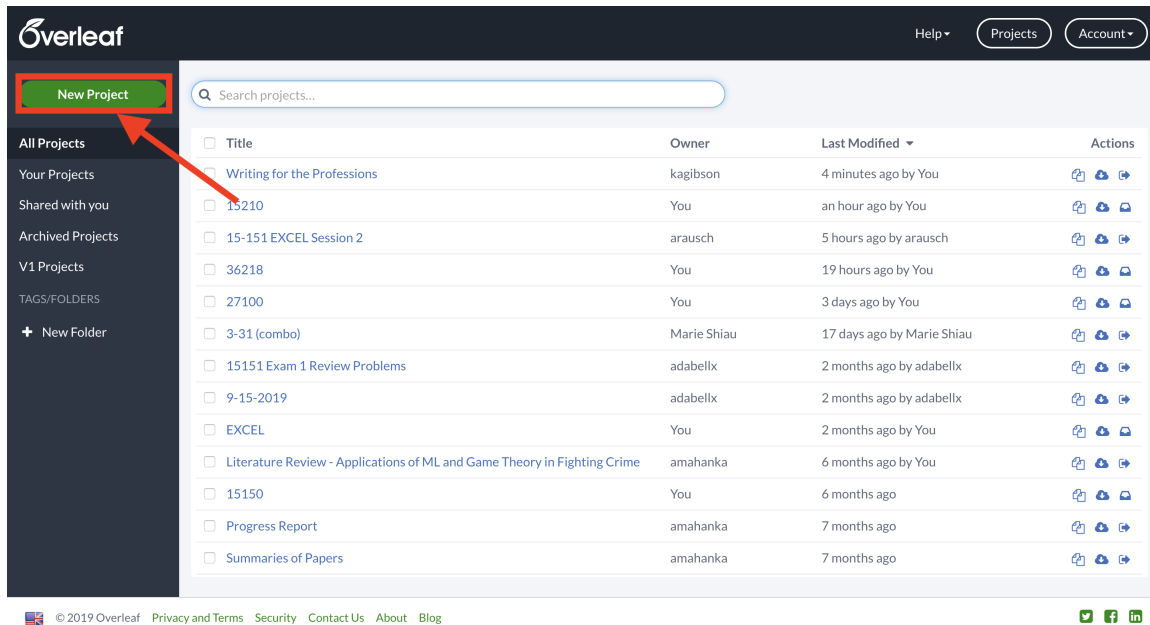
1. Click on "New Project"

2. Select "Blank Project" from the drop-down menu.

3. Type in the project name and click "Create".

The following markdown editor will appear:

The layout is divided as follows:

- The left column allows access to various files in the project.

- The middle section is the editor where you write the source code for your document.

- The right-most section is a PDF rendering of your current source code.

Note that arrows point to commonly used buttons for adding a new file in the project, downloading the current file as a PDF, and entering full screen.

2   Things to Know

1. Double click on any section of the rendered PDF to jump to that section of the source code

2. Use a double backslash to print on the next line

```
Line 1 \\ Line 2
```

renders as

```
Line 1
Line 2
```

3 Formatting

3.1 Sections

The sections commands are built into Latex and do **not** require any additional packages.

- Numbered Sections Hierarchy:

Code	Output
\section{Section Name}	# 1 Section Name
\subsection{Section Name}	**1 Section Name**
\subsubsection{Section Name}	**1 Section Name**

- Unnumbered Sections Hierarchy:

Code	Output
\section*{Section Name}	# Section Name
\subsection*{Section Name}	**Section Name**
\subsubsection*{Section Name}	**Section Name**

3.2 Alignment

Alignment options:

- Enumerated Lists

```
\begin{enumerate}
        \item \\
        \item \\
\end{enumerate}
```

  Note that each \item gives the next number in the list.

- Bulleted Lists

```
\begin{itemize}
        \item \\
        \item \\
\end{itemize}
```

  Note that each \item gives the next bullet in the list.

- Aligned Text:

```
\begin{align}
        text &alignment text \\
        &alignment text
\end{align}
```

  Note that the & creates the column of alignment and text can go before or after. However, the align environment uses math mode by default.
  The above when tranferred to text mode renders as:

  text alignment text
       alignment text

4 Various Modes and Environments

4.1 Math Mode

Knowing how to format math symbols and equations is invaluable knowledge to have when using LaTeX. There are several ways to create math environments, which we will cover below. Remember to always include the **amsmath** package, which includes many useful math symbols.

```
\usepackage{amsmath}
```

1. $$ - single dollars

   Inserting text in between two single dollars renders math symbols in place. For example:

   ```
   The equation is $1 + 2 = 3$.
   ```

   renders as:
   The equation is $1 + 2 = 3$.

2. $$$$ - double dollars

   Inserting text in between two double dollars renders math symbols in the center of the page. For example:

   ```
   The equation is $$1 + 2 = 3.$$
   ```

   renders as:
   The equation is
   $$1 + 2 = 3.$$

   It is customary to put punctuation like periods or commas before the ending $$.

3. the **equation*** environment Inserting text in a **equation*** environment renders that text similar to single dollars, but with an inline.

   ```
   \begin{equation*}
   1 + 1 = 2
   \end{equation*}
   ```

   renders as

   $$1 + 1 = 2$$

4. the \[\] environment. This is a shorthand for the **equation*** environment.

```
\[
1 + 1 = 2
\]
```

renders as

$$1 + 1 = 2$$

5. the **align*** environment is special. You can align multiple lines of math equations with the & symbol.

```
\begin{align*}
1 + 1 + 1 + 1 &= 2 + 1 + 1\\
&= 2 + 2\\
&= 4\\
\end{align*}
```

renders as

$$
\begin{aligned}
1 + 1 + 1 + 1 &= 2 + 1 + 1 \\
&= 2 + 2 \\
&= 4
\end{aligned}
$$

4.2 Common Math Symbols

We have listed common math symbols that you can enter into any math environment listed above.

Symbol	Example	Code
Fractions	$\frac{5}{4}$	\frac{5}{4}
Square Root	$\sqrt{2}$	\sqrt{2}
Superscript	a^{2x}	a^{2x}
Subscript	x_{15}	x_{15}
Equivalent	$\equiv$	\equiv
Not equal to	$\neq$	\neq
Less than equal to	$\leq$	\leq
Greater than equal to	$\geq$	\geq
Summation	$\sum$	\sum
Product	$\prod$	\prod
Integral	$\int_a^b$	\int_{a}^{b}
Infinity	∞	\infty
Exists	$\exists$	\exists
For all	$\forall$	\forall
Element of	$\in$	\in
Set union	$\cup$	\cup
Set intersection	$\wedge$	\wedge
Subset	$\subset$	\subset
Integers	$\mathbb{Z}$	\mathbb{Z}
Real numbers	$\mathbb{R}$	\mathbb{R}
Rational numbers	$\mathbb{Q}$	\mathbb{Q}
Natural numbers	$\mathbb{N}$	\mathbb{N}
Implied by	$\Rightarrow$	\Rightarrow

4.3   Matrices

To create a matrix, you use different types of environments *inside* some math environment. We will present them below

1. **matrix**

   This environment creates no surrounding punctuation, and creates floating numbers.

   ```
   $ \begin{matrix}
   a & b\\
   c & d
   \end{matrix} $
   ```

   $\begin{matrix} a & b \\ c & d \end{matrix}$

2. **pmatrix**

   This environment creates a matrix with parenthesis as surrounding punctuation.

   ```
   $ \begin{pmatrix}
   a & b\\
   c & d
   \end{pmatrix} $
   ```

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

3. **bmatrix**

   This environment creates a matrix with brackets as surrounding punctuation.

   ```
   $ \begin{bmatrix}
   a & b\\
   c & d
   \end{bmatrix} $
   ```

   $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$

4.4   Inserting Code

Often times in CS classes you will need to write pseudocode or an algorithm in a language such as Python, C, or SML. You could just write your code as prose in LaTeX, but making sure that reserved symbols like % and \ from your code render properly is a pain. To solve this, there is a text environment that renders any text you write literally.

1. First, you need to import the **listings** package at the top of your LaTeXdocument like this:

   ```
   \usepackage{listings}
   ```

2. Then, suppose you want to insert some text that looks like code. You should create a **lstlisting** environment like this:

   ```
   \begin{lstlisting}
   \end{lstlisting}
   ```

   Then you can enter your code:

   ```
   \begin{lstlisting}
   print("Hello, World!")
   a = 0
   b = a + 1
   \{lstlisting}
   ```

   This should render as

   ```
   print("")
   a = 0
   b = a + 1
   ```

4.5   Images

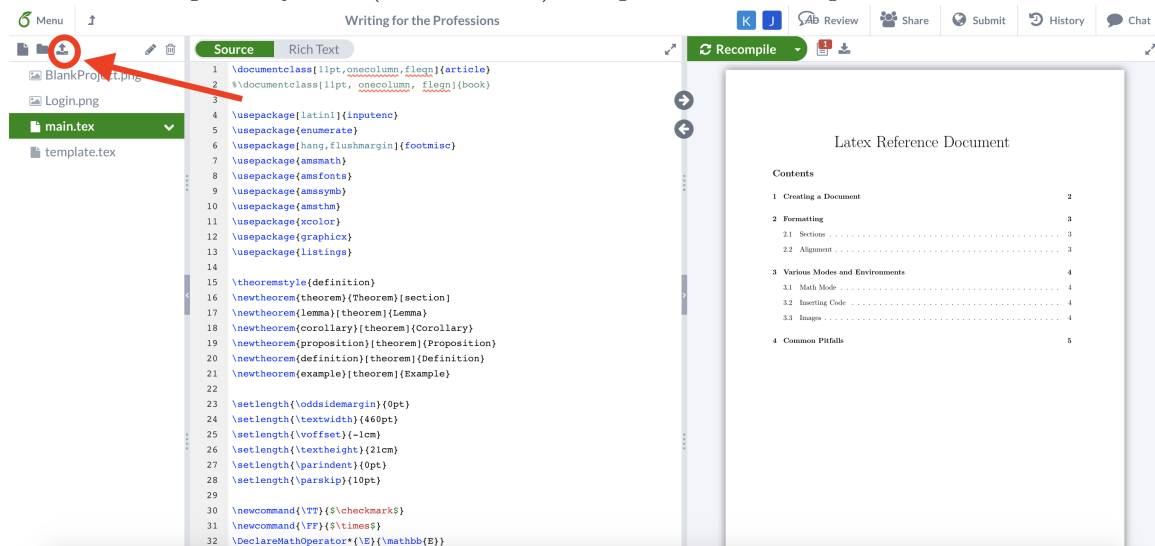Images are inserted into documents in latex using the **graphicx** package.
To use this package, include the following line after the \documentclass command:

> \usepackage{graphicx}

Let's say the image you want to insert is in the file *sampleimage.png*.

1. Upload the image to Overleaf
   Click on the upload symbol (shown below) and pick the file to upload

2. Insert the uploaded image
   Use the following command to insert the image into the document

   > \includegraphics[scale=0.2]{sampleimage.png}

   The value assigned to scale decides how large the image is.
   (Note: You can also size images by specifying width instead of scale, for example, width=100mm
   instead of scale=0.2)

5 Common Pitfalls

-