Technical Report Writing & Research Methodology

Introduction to Latex in Overleaf

Course Instructor

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What is Latex?

- LaTeX (pronounced LAY-tek or LAH-tek) is a tool used to create professional-looking documents.
- Based on the WYSIWYM (what you see is what you mean) idea
  - You only have to focus on the contents of your document and the computer will take care of the formatting.
- Users can enter plain text and let LaTeX take care of the formatting (Unlike MS word).

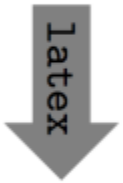
Why use LaTeX?

- LaTeX is used all over the world for scientific documents, books, as well as many other forms of publishing.
- Can create beautifully typeset documents.
- Enables the user to tackle the complicated parts of typesetting like
  - Inputting mathematics.
  - Creating tables of contents.
  - Referencing and creating bibliographies and many more.
- Has a number of open source packages providing endless formatting possibilities.

How does it work?

- You write your document in plain text with **commands** that describe its structure and meaning.
- The LaTeX program processes your text and commands to beautifully formatted document.

```
The rain in Spain falls \emph{mainly} on the plain.
```



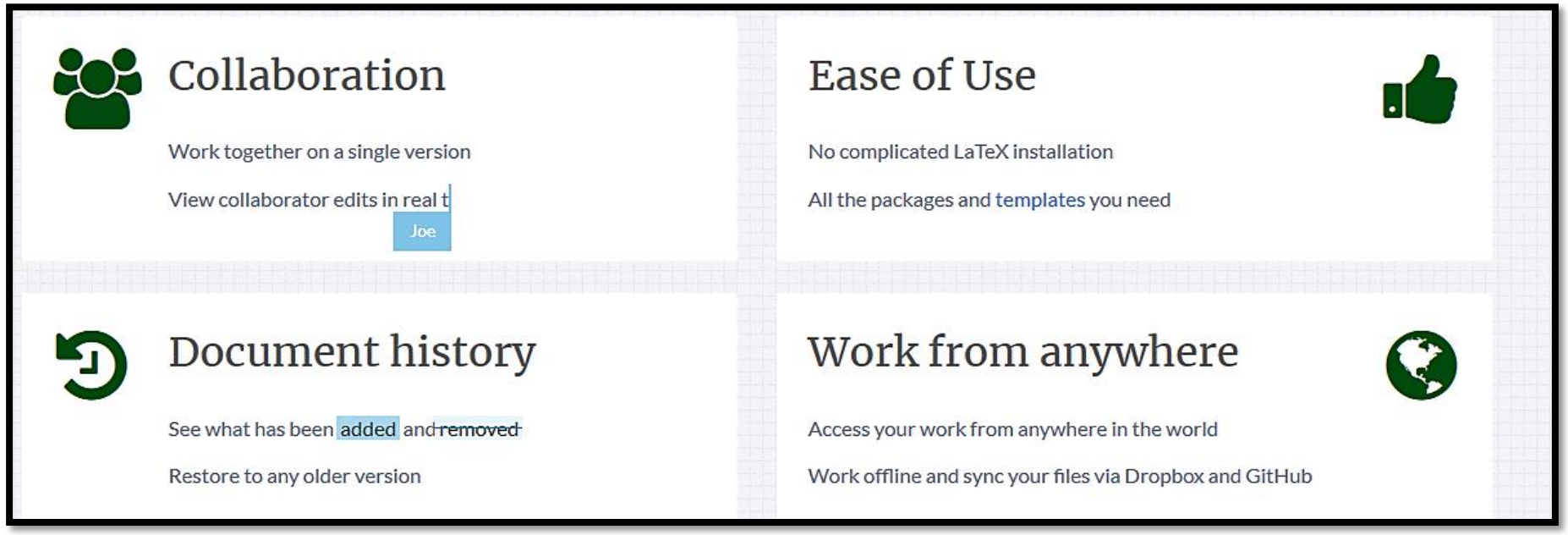
The rain in Spain falls *mainly* on the plain.

LaTeX modes of Usage

- LaTeX can be used either in offline mode or online mode.
- For using LaTeX offline, you need to install softwares like MiKteX (backend-runs all the packages) and text editors like TeXstudio,WinEdt,TexNic (front end- where you write all your LaTeX code).
- For online mode, Overleaf is used.
- Overleaf is an online LaTeX editor that is easy to use. No installation, real-time collaboration,hundreds of LaTeX templates, and more.

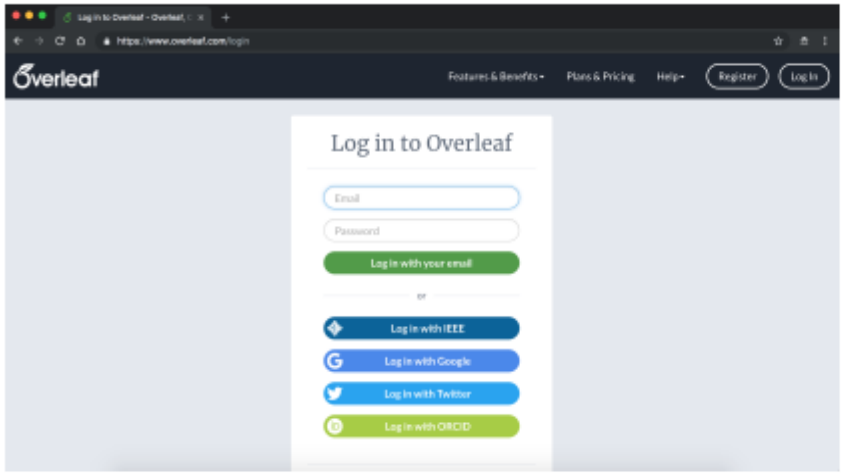
Overleaf

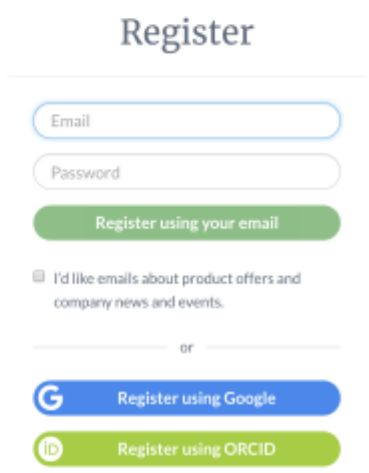
- Templates for papers, presentations, newsletters, syllabi, books.
- Online collaboration platform.
- Output: nice PDF files.



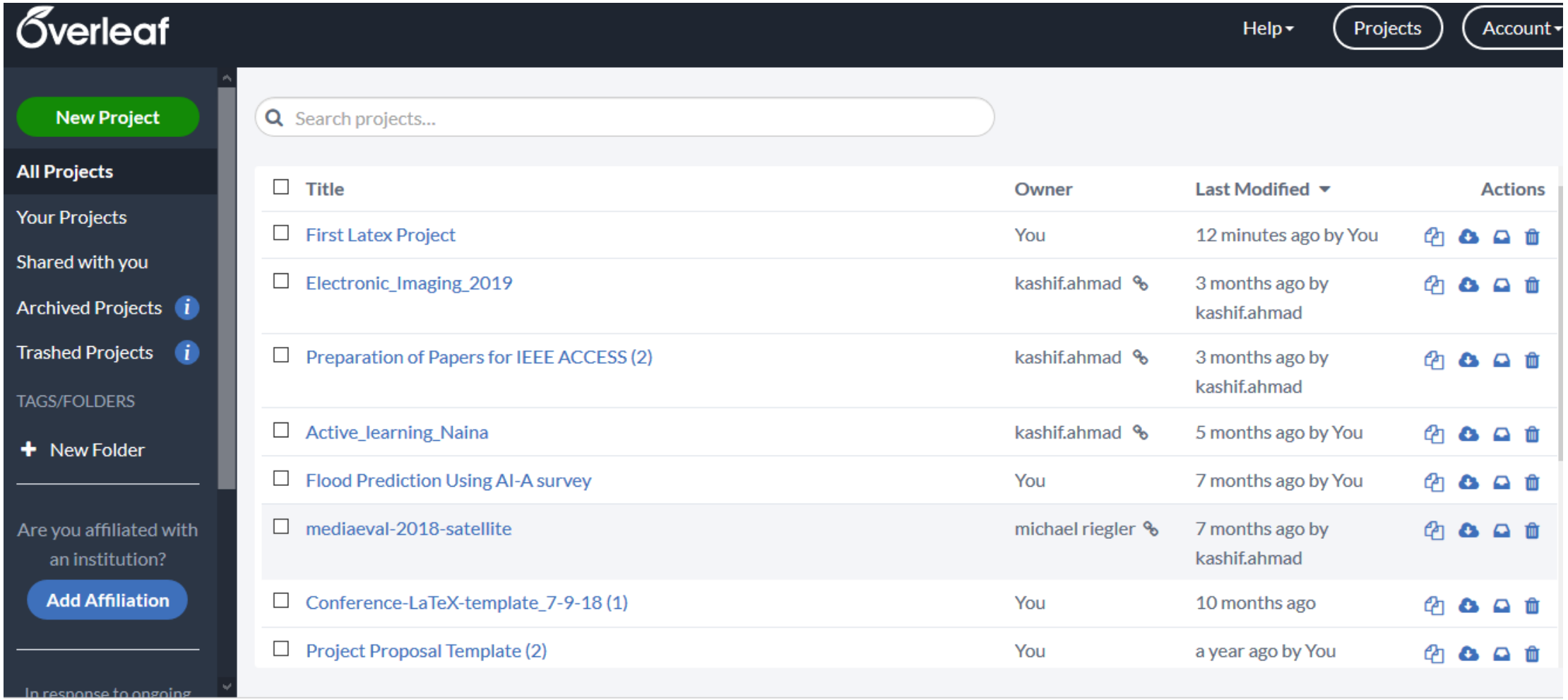
Login/Signup with Overleaf

Login or Register with Overleaf -**https://www.overleaf.com/**



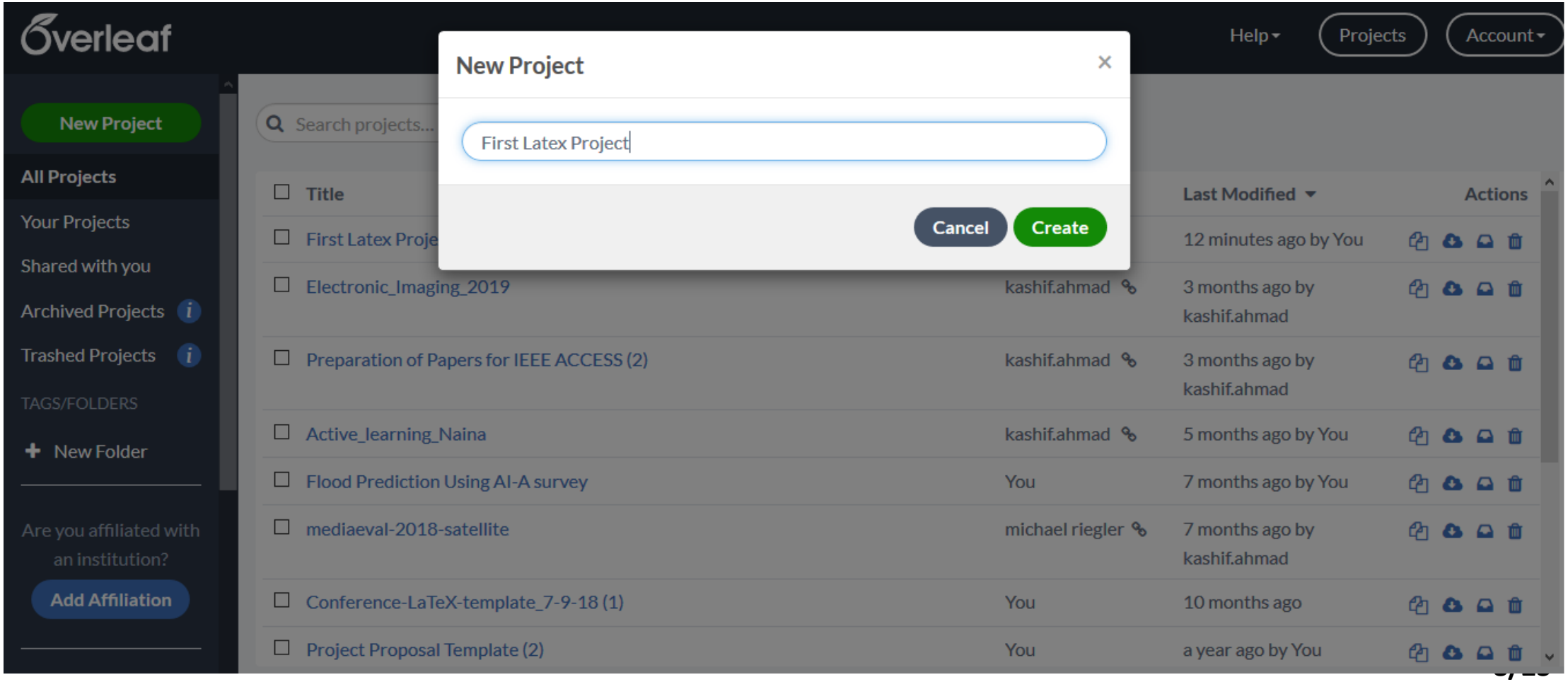


Overleaf Structure



Creating a project in Overleaf

Select New Project > Blank Project > Give it a name > Create

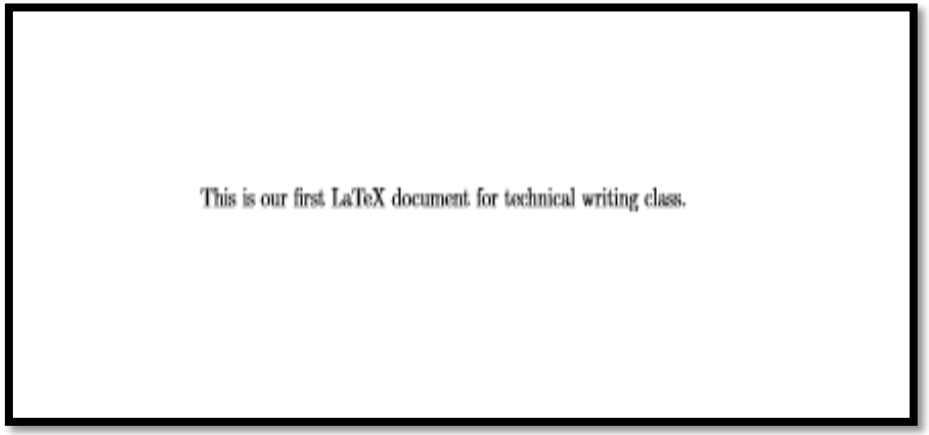


Writing your first piece of LaTeX

```
\documentclass{article}

\begin{document}
This is our first LaTeX document for technical writing class.

\end{document}
```



Understanding the first piece of Latex

- Class declares the type of the document.
  - Controls the overall appearance of the document.
  - Different types of documents will require different classes i.e. a CV/resume will require a different class than a scientific paper.
  - In this case, the class is article, the simplest and most common LaTeX class.
  - **Report** or **book** are some other type of classes.
- The content of our document is enclosed inside the \begin{document} and \end{document} tags.
- This is known as the body of the document.

The preamble of a document

- Everything in your .tex file before the \begin{document} tag is called the preamble.
- In the preamble you define
  - The type of document you are writing.
  - The packages you would like to use.
  - Several other elements.
- Example shows LaTeX document of font size 12 (default 10),paper size letterpaper and encoding utf8.

```
\documentclass[12pt, letterpaper]{article}
\usepackage[utf8]{inputenc}
```

Adding Author, Date and Title

```
\documentclass[12pt, letterpaper, twoside]{article}
\usepackage[utf8]{inputenc}

\title{Enter Document Name Here}
\author{Enter Author Name Here}
\date{Enter Date Here}
\begin{document}

\maketitle

We have now added a title, author and date to our LaTeX
document!

\end{document}
```

Adding Comments

```
\begin{document}

\maketitle

We have now added a title, author and date to our first Latex document!

% This line here is a comment. It will not be printed in the document.

\end{document}
```

Bold, Italics and Underline

```
\begin{document}

\maketitle

Some of the \textbf{greatest}
discoveries in \underline{science}
were made by \textbf{\textit{accident}}.

\end{document}
```

Adding Images

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

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

\includegraphics{universe}

Here is picture of a cat.
\end{document}
```

Captions, labels and references

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

\begin{document}
\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:mesh1}, the
function grows near 0. Also, in the page \pageref{fig:mesh1}
is the same example.
\end{document}
```

Unordered List

```
\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}
```

Ordered List

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

Adding Math to Latex

Inline

In physics, the mass-energy equivalence is stated by the equation **$E=mc^2$,** discovered in 1905 by Albert Einstein.

Displayed

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}

Sections

```
\documentclass{article}
\begin{document}
This is our first LaTeX document for technical writing class.
\section{Introduction}
\section{Background}
\section{Literature Review}
\end{document}
```

Subsections

```
\documentclass{article}
\begin{document}
This is our first LaTeX document for technical writing class.
\section{Introduction}
\section{Background}
\section{Literature Review}
\subsection{Subsection 1 of Lit Review}
\subsection{Subsection 2 of Lit Review}
\end{document}
```

Latex : Endless Possibilities

- There are endless things you can do with LaTeX.
- Explore more on the official site of overleaf : https://www.overleaf.com/

Assignment

- Write the Abstract and Literature Review part of your MSc proposal in LaTeX.
- **Submission deadline. Two weeks starting from today.**