Introduction to LaTeX for Beginners

Session 1: The Basics

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Outline of Today's Session

What is LaTeX?

- A high-quality typesetting system.

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- Focuses on your **content**, not its appearance.
- Widely used for academic papers, theses, and presentations.
- Produces beautiful, professional documents.

Join Along

https://tinyurl.com/latexplayground

Core Document Structure

Every LaTeX document has two main parts.

1. The Preamble

- Starts with `\documentclass{...}`.
- Load packages (`\usepackage`) and define global settings here.

2. The Document Body

- Everything between `\begin{document}` and `\end{document}`.
- **This is where all your content goes!**

Basic Text Formatting

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- `\textit{Italic Text}` → *Italic Text*
- `\texttt{Typewriter Text}` → `Typewriter Text`

Practice Time!

Task:

Write a two-sentence quote. Make the entire quote *italicized*. On a new line, attribute the quote using an em-dash (—), followed by the author's name in **bold**.

Example Solution

Your output should look like this

The only way to do great work is to love what you do. If you haven't found it yet, keep looking. Don't settle.

— Steve Jobs

Inline vs. Display Math

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$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

Common Math Commands

- **Subscripts & Superscripts:** Use _ and ^. For multiple characters, use curly braces. `$x_i^ 2$` $\rightarrow x_i^2$ `$x_{10}^ {2n}$` $\rightarrow x_{10}^{2n}$

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- **Sums & Integrals:**

  `$ \sum_{i=1}^{\infty} \frac{1}{i^2} $` → $\sum_{i=1}^{\infty} \frac{1}{i^2}$

  `$ \int_{0}^{1} x^2 dx $` → $\int_0^1 x^2 dx$

The Equation Environment

For numbered equations that you might want to refer to later.

```
\begin{equation} \label{eq:pendulum}
  T = 2\pi\sqrt{\frac{L}{g}}
\end{equation}
```

Result:

$$T = 2\pi\sqrt{\frac{L}{g}} \tag{1}$$

Practice Time!

Task:

Typeset the formula for the sum of a geometric series using the `equation` environment: $S_n = a\frac{1-r^n}{1-r}$.

Example Solution

Your output should look like this

$$S_n = a\frac{1-r^n}{1-r} \tag{2}$$

Creating Lists

Unordered Lists

- Apples
- Oranges
- Pears

Ordered Lists

1. First step
2. Second step
3. Third step

Practice Time!

Task:

Create a short "To-Do" list for today using the `itemize` environment. Include at least three items.

Example Solution

Your output should look like this

- Attend LaTeX workshop
- Finish physics assignment
- Go for a walk

Creating a Table

Use the `tabular` environment for tables. Inside, use `&` to separate columns and `\\` to end a row. The table environment is needed for adding labels and captions (you can skip if not needed).

```
\begin{table}
\begin{tabular}{cc} % {cc} = two centered columns
  \toprule
  Length (m) & Period (s) \\ % & separates columns
  \midrule
  0.5 & 1.42 \\ % \\ ends the row
  1.0 & 2.01 \\
  1.5 & 2.46 \\
  \bottomrule
\end{tabular}
\caption{Example Table}
\end{table}
```

Practice Time!

Task:

Create a simple 3×2 table listing two of your favorite subjects and their instructors. Use the `booktabs` commands for a clean look.

Example Solution

Your output should look like this

Subject	**Instructor**
Calculus I	Prof. Sharma
Intro to CS	Prof. Gupta

Table: Example Table

Including an Image

The `figure` environment wraps your image and allows for a caption.

```
\begin{figure}
  \centering
  \includegraphics[width=0.6\textwidth]{your-image-
      name.jpg}
  \caption{An example image.}
  \label{fig:example}
\end{figure}
```

Practice Time!

Task:

Upload an image to your project and display it at half width.

Example Solution

Your code would look like this

```
\begin{figure}
  \centering
  \includegraphics[width=0.5\textwidth]{my_photo.jpg}
  \caption{This is my custom photo!}
\end{figure}
```

Example Solution

Your result should look like this

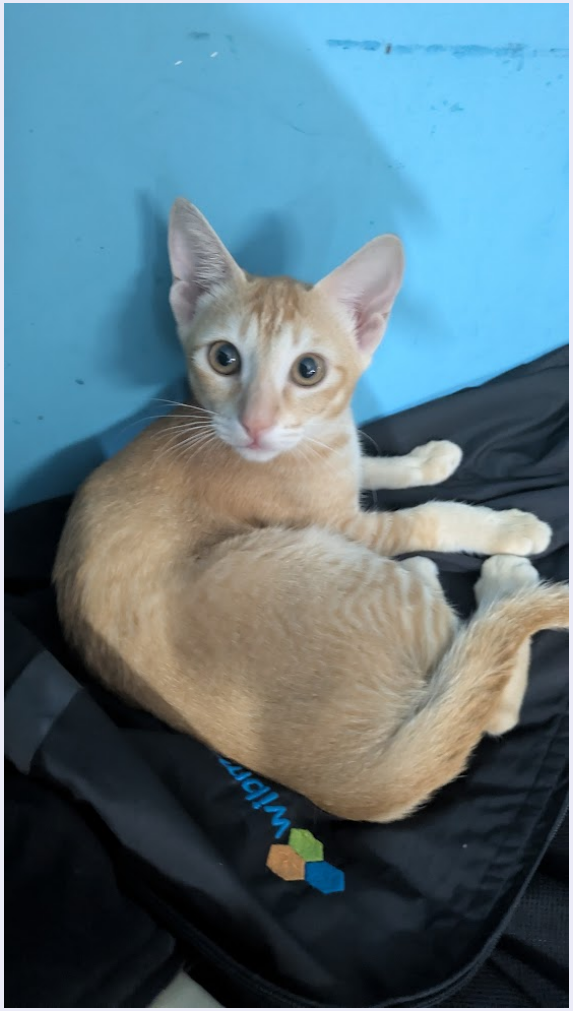

Figure: Why so cute!

Using the ‘listings‘ Package

Showcasing code is easy. Wrap it in a `lstlisting` environment and specify the language.

```
\begin{lstlisting}[language=Python, caption={A
    function}]
def factorial(n):
    """Calculates the factorial of a number."""
    if n == 0:
        return 1
    else:
        return n * factorial(n - 1)

print(f"5! is {factorial(5)}")
\ end{lstlisting}
```

Using the ‘listings‘ Package

Result:

Listing 1: A function

```
def factorial(n):
    """Calculates the factorial of a number."""
    if n == 0:
        return 1
    else:
        return n * factorial(n - 1)

print(f"5! is {factorial(5)}")
```

Practice Time!

Task:

Display a ‘for‘ loop from your favorite programming language. Add a caption using the `language=...` option for syntax highlighting.

Example Solution

Your output should look like this

Listing 2: A simple for loop in Python.

```
for i in range(5):
    print(f"Iteration number {i}")
```

The Power of Referencing

Manually numbering figures and equations is tedious. LaTeX automates this!

1. **Label it:** Add `\label{some-name}`.

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1. **Label it:** Add `\label{some-name}`.
2. **Reference it:** Use `\ref{some-name}` to insert the number.

Practice Time!

Task:

Label the geometric series equation as `eq:geo_series`, and a figure or table as well. Write a sentence referencing both using `\ref`.

Example Solution

Code you would write

```
The formula in Equation \ref{eq:geo_series} is illustrated
by the chart in Figure \ref{fig:my_image}.
```

Thank You!

Questions?