

The Joys of L^AT_EX

A ≤ 45 minute lecture, with examples, introducing the world's standard typesetting language.

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<http://vadim.sdsu.edu/latex-reu23.pdf>

<http://vadim.sdsu.edu/latex-reu23.tex>

What is \LaTeX ?

\LaTeX is not:

- Word processor
- Editor
- Computer program

\LaTeX is:

- Language in which documents are specified in a logical (not physical) manner

Benefits

- Professional-looking output

Ligatures: of fluffing (MS Word) of fluffing (L^AT_EX)

Kerning: Table (MS Word) Table (L^AT_EX)

- math formulas, footnotes, references, tables of contents, indices, bibliographies, etc.
- Device and platform independent
- Text-based
- Encourages good organization
- Free

Benefits

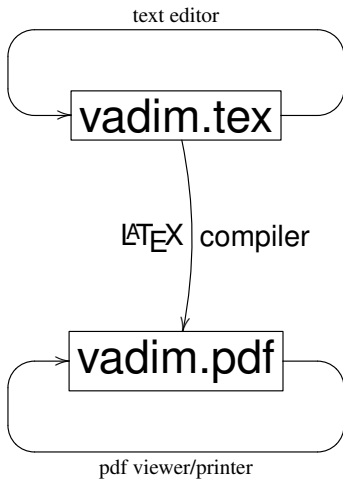
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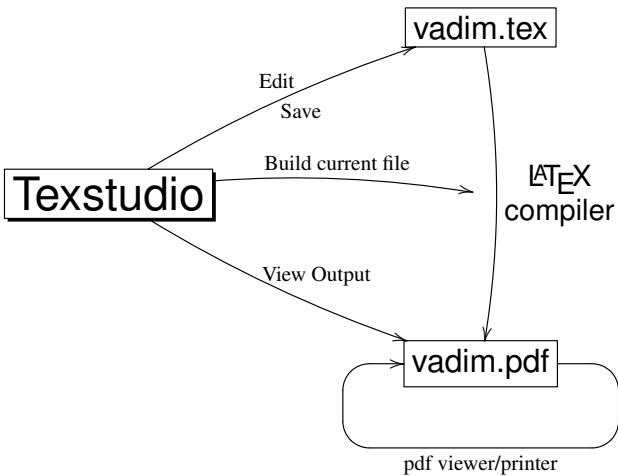
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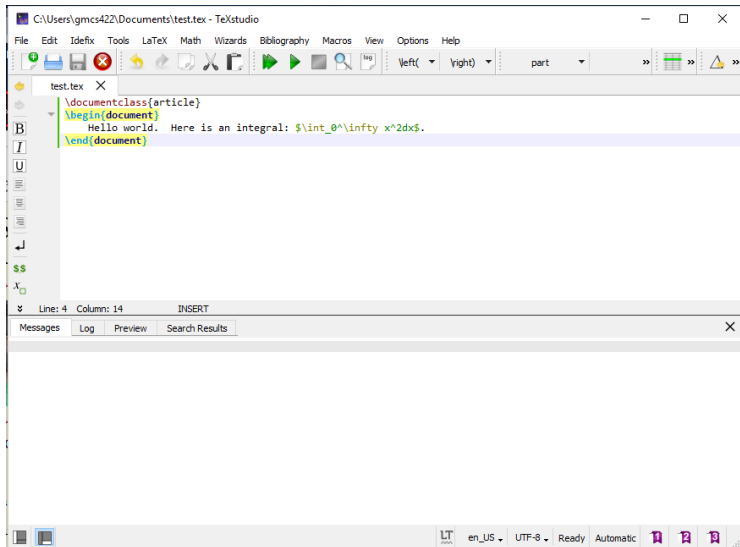
Simplified Usage



Less Simplified Usage



Texstudio



The screenshot shows the TeXstudio interface with a document titled "test.tex". The main editor area contains the following LaTeX code:

```
\documentclass{article}
\begin{document}
  Hello world. Here is an integral:  $\int_0^{\infty} x^2 dx$ .
\end{document}
```

The status bar at the bottom indicates "Line: 4 Column: 14 INSERT". The bottom right corner shows the LaTeX logo, "en_US", "UTF-8", "Ready", "Automatic", and three icons.

Overleaf

The screenshot displays the Overleaf online LaTeX editor interface. The browser address bar shows the URL `overleaf.com/project/62a37f0eba7f6a099e1c75f`. The editor is titled "sample" and includes a navigation menu with options like "Menu", "Upgrade", "Review", "Share", "Submit", "History", and "Chat".

The left pane shows the source code for `main.tex` with the following content:

```
1 \documentclass{article}
2 \usepackage[utf8]{inputenc}
3
4 \title{sample}
5 \author{vadin123}
6 \date{June 2022}
7
8 \begin{document}
9
10 \maketitle
11
12 \section{Introduction}
13
14 \end{document}
15
```

The right pane shows the rendered output, which includes the title "sample", the author "vadin123", the date "June 2022", and a section header "1 Introduction".

Example 1

```
\documentclass[12pt]{letter}
\begin{document}
Don't worry about spaces or
line breaks; they are handled for you. %Comments
Math is easy:  $\frac{1}{2} + \int_0^\infty x^{10} dx$ .
Use \emph{this} for important words.
\end{document}
```

Don't worry about spaces or line breaks; they are handled for you. Math is easy: $\frac{1}{2} + \int_0^\infty x^{10} dx$. Use *this* for important words.

Example 2

```
\usepackage{fancybox}
\begin{document}
\Ovalbox{
  \begin{tabular}{|lr|}
  \hline left & right \\
  justified & justified \\
  \hline \end{tabular}
}
\end{document}
not compiled
```

left	right
justified	justified

Example 3

Important equations can get a number and their own line:

```
\begin{equation} 3^{2^x} \geq \mu \end{equation}
 $x_1 > x_2 > \cdots, x_i \in \mathbb{R},$ 
 $\sqrt{\sqrt[3]{x}}, \sin x, \dots$ 
```

Important equations can get their a number and own line:

$$3^{2^x} \geq \mu \tag{1}$$

$x_1 > x_2 > \cdots, x_i \in \mathbb{R}, \sqrt{\sqrt[3]{x}}, \sin x, \dots$

Example 4

```
\newtheorem{vthm}{Theorem}
\begin{vthm}good theorem\label{good}\end{vthm}
\begin{proof}blah, blah\end{proof}    (amsthm)
\begin{vthm}great theorem\label{great}\end{vthm}
We now generalize Theorem \ref{good}
and Theorem \ref{great}.
```

Theorem 1. *good theorem*

Proof.

blah, blah



Theorem 2. *great theorem*

We now generalize Theorem 1 and Theorem 2.

Example 5

```

 $\sum_{i=1}^7 3i$  \hspace{1in}
 $\underset{i=1}{\overset{7}{\sum}} 3i$  \hspace{1in}
 $\underset{x\to\infty}{\lim} x^2$  \\
\vspace{3.6mm}

 $\displaystyle \lim_{x\to\infty} x^2$ 

```

$$\sum_{i=1}^7 3i$$

$$\sum_{i=1}^7 3i$$

$$\lim_{x \rightarrow \infty} x^2$$

Use ‘ and ’; avoid the sweet temptation of "

Other units: in, cm, pt, \textwidth, \pagewidth,
weird ones like bp (=1.00375pt)

Example 6

```
\section{Introduction}\label{yes_you_can}
\subsection{Numbered}
\subsection*{Not Numbered}
\subsubsection{You don't need these}
\newcommand{\vadam}[2]
{\overset{#2}{\underset{#1}{\sum}}}
$\left( \vadam{i=0}{5} \right) \! \! \! \! x$
```

$$\left(\sum_{i=0}^5 \right) x$$

Basics

- Always load:
`amsmath, amsthm, amssymb, amsfonts`
- Often useful: `fullpage`
- All packages at: <http://www.ctan.org>

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Including Graphics

- Use package `graphicx` (not needed with Beamer), and LaTeX => PDF.

- For raster images (png, jpg, gif) and pdf, use:

```
\includegraphics[width=2in]{vadims_image}
```

No extension needed, the wrong file is picked automatically

- For vector images, convert eps to pdf using `epstopdf`.
- If it didn't work, or is misaligned, prepare to waste an afternoon. Try: `minipage`, `raisebox`, `figure`

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Beamer

- **Packages** `latex-beamer`, `pgf`, `xcolor` must be installed.
- Pick a theme, e.g. `Singapore`
- Most \LaTeX commands unchanged, some new ones (e.g. `\pause`)
Find other people's code and steal it.
- Manual available at:
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BibTeX

```
\cite{lamport}
\bibliography{vadim} \bibliographystyle{plain}
```

```
@BOOK{lamport,
  author = "Leslie Lamport",
  title = "{\LaTeX:} {A} Document ...",
  publisher = "Addison-Wesley",
  year = 1986 }
```

<http://www.ams.org/mathscinet/search>

Other Resources

The Not So Short Introduction to L^AT_EX₂ε, Oetiker et al:

<http://tobi.oetiker.ch/lshort/lshort.pdf>

Online tutorial:

<http://www.tug.org/tutorials/tugindia/>

Mac users:

<https://computers.tutsplus.com/tutorials/the-beginners-guide-to-using-tex-in-os-x--mac-45177>