

L^AT_EX

Introduction to L^AT_EX

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- What is \LaTeX ?
Typesetting software; not a word processor
- What are its key features?
Flexibility; mathematical typesetting; community support
- Where do I get the software?
 \TeX Live DVD or \TeX Users Group online
- How do I learn to use it?
Reference manuals/books, online sources, ...

- Kopka and Daly, *Guide to \LaTeX , 4th Edition*, Addison-Wesley, 2003.
<http://proxy.library.eiu.edu:2932/9780321617736/>
- Grätzer, *More Math into \LaTeX , 4th Edition*, Springer, 2007.
<http://www.springerlink.com/content/k73023/?p=96f1fa63d0fd45af945a81c1253fbf5a&pi=0>
- Grätzer, *Short Course (excerpt)*,
http://ctan.org/tex-archive/info/Math_into_LaTeX-4/Short_Course.pdf
- Lamport, *\LaTeX : A Document Preparation System*, Addison-Wesley, 1994.
- www.tug.org/begin.html

A few $\text{T}_{\text{E}}\text{X}$ front-ends



$\text{T}_{\text{E}}\text{X}$ Shop
Mac



$\text{T}_{\text{E}}\text{X}$ works
Mac, Windows, Linux

A sample document with page margins

```
\documentclass[11pt]{article}
\usepackage[left=1in,
             right=1in,
             top=0.75in,
             bottom=0.5in]{geometry}

\begin{document}
  Hello, world!
\end{document}
```

Every document has a **preamble** and a **body**.

Try it now.

Some useful packages

```
\usepackage{amsmath}           % AMS enhancements
\usepackage{amsthm}           % theorem environments
\usepackage{amssymb,latexsym} % more symbols
\usepackage{graphicx}         % Graphics inclusion
```

Packages are declared in the **preamble** of the \LaTeX source file.

Special characters

These characters have special meaning:

\$ & _ % { }

A `\` prefix avoids this special meaning:

\# \\$ \& _ \% \{ \}

```
\command[optional]{required}
```

or

```
\command[optional]{required}{required}
```

Examples:

```
\section{Introduction}  
\hspace{2in}  
\rule[0.5in]{1in}{2in}
```

```
\begin{environment-name}  
  ...  
\end{environment-name}
```

Examples:

- `quote`
- `center`
- `enumerate`
- `itemize`
- `tabular`

The itemize environment

\LaTeX code

```
\begin{itemize}
  \item Planes
  \item Trains
  \item Automobiles
\end{itemize}
```

Typeset result

- Planes
- Trains
- Automobiles

Try it now.

The enumerate environment

\LaTeX code

```
\begin{enumerate}  
  \item Planes  
  \item Trains  
  \item Automobiles  
\end{enumerate}
```

Typeset result

1. Planes
2. Trains
3. Automobiles

Try it now.

Adjusting font attributes

L^AT_EX code

```
...normal, \emph{emphasized}, \textbf{bold},  
\texttt{typewriter}, normal...
```

Typeset result

...normal, *emphasized*, **bold**, typewriter, normal...

Formatting tables

L^AT_EX code

```
\begin{tabular}{l|c|r}  
President      & Party      & Term \\ \hline  
Jimmy Carter  & Democrat   & 1977--1981 \\ \hline  
Abraham Lincoln & Republican & 1861--1865 \\ \hline  
\end{tabular}
```

Typeset result

President	Party	Term
Jimmy Carter	Democrat	1977–1981
Abraham Lincoln	Republican	1861–1865

- In-line mathematics: mixed with text

... $\$$ mathematics text $\$$...

From algebra, we know $(a + b)^2 = a^2 + 2ab + b^2$ for any two real numbers a and b .

- Displayed mathematics: set off from text

... $\backslash[$ mathematics text $\backslash]$...

From algebra, we know

$$(a + b)^2 = a^2 + 2ab + b^2$$

for any two real numbers a and b .

Subscripts and superscripts

\LaTeX code

```
$x^2 + y^2$
```

```
$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
```

```
$$\int_0^\pi x^2 dx$
```

```
$$\displaystyle \int_0^\pi x^2 dx$
```

Typeset result

$$x^2 + y^2$$

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\int_0^\pi x^2 dx$$

$$\int_0^\pi x^2 dx$$

More about subscripts and superscripts

\LaTeX code

```
 $2^{a + b}$ 
```

```
 $A_{i + 1, j}$ 
```

```
 $2^{2^{2^n}}$ 
```

```
 $A_{i, j}^k$ 
```

Typeset result

$$2^{a+b}$$
$$A_{i+1,j}$$
$$2^{2^{2^n}}$$
$$A_{i,j}^k$$

Try it now.

Aligning multi-line equations

L^AT_EX code

```
\begin{align*}
(a+b)(a-b) &= a^2 - ab + ab - b^2 \\
&= a^2 - b^2
\end{align*}
```

Typeset result

$$\begin{aligned}(a + b)(a - b) &= a^2 - ab + ab - b^2 \\ &= a^2 - b^2\end{aligned}$$

A few functions

```
\cos    \log    \lim    \ln    \log    \sin    \tan
```

\LaTeX code

```
$$\sin^2 x + \cos^2 x = 1$
```

Typeset result

$$\sin^2 x + \cos^2 x = 1$$

Fractions

```
\frac{numerator}{denominator}
```

L^AT_EX code

```
\[ \frac{a^2 - b^2}{a + b} = a - b \]
```

Typeset result

$$\frac{a^2 - b^2}{a + b} = a - b$$

A few relations

`\neq` `\leq` `\approx` `\subset` `\in` `\notin`

Typeset result

\neq \leq \approx \subset \in \notin

Sampling the Greek alphabet

\LaTeX code

`\alpha` `\beta` `\gamma` `\delta` `\epsilon`

Typeset result

α β γ δ ϵ

\LaTeX code

`\Gamma` `\Delta` `\Theta` `\Sigma` `\Omega`

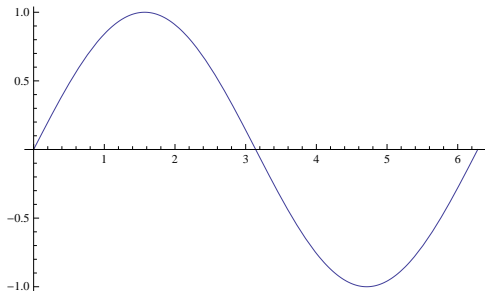
Typeset result

Γ Δ Θ Σ Ω

Including graphics

Suppose you have a graphics file named `sine.pdf`

```
\includegraphics[width=2.5in]{sine}
```



Graphics files can be generated and exported by a wide variety of computer programs — this one is from Mathematica.

Typeset the sample page

Refer to Appendix B of Grätzer's book