

L^AT_EX

Introduction to L^AT_EX

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Overview

- What is L^AT_EX?
A “markup” language for typesetting
- What are its key features?
Flexibility; mathematical typesetting; community support
- Where do I get the software?
T_EXLive DVD or T_EX Users Group online
- How do I learn to use it?
Reference manuals/books, online sources, ...

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Learning about L^AT_EX

- Kopka and Daly, *Guide to L^AT_EX, 4th Edition*, Addison-Wesley, 2003.
<http://proxy.library.eiu.edu:2932/9780321617736/>
- Grätzer, *More Math into L^AT_EX, 4th Edition*, Springer, 2007.
<http://proxy1.library.eiu.edu:2112/book/10.1007/2F978-0-387-68852-7>
- Getting Started with T_EX, L^AT_EX, and Friends:
<http://www.tug.org/begin.html>
- L^AT_EX (a Wikibook):
<http://en.wikibooks.org/wiki/LaTeX>

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A few T_EX front-ends



TeXShop
Mac



TeXworks
Mac, Windows, Linux

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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**.

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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 L^AT_EX source file.

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Special characters

These characters have special meaning:

```
# $ & - % { }
```

A `\` prefix avoids this special meaning:

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

L^AT_EX command syntax

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

or

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

Examples:

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

L^AT_EX environments

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

Examples:

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

The itemize environment

L^AT_EX code

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

Typeset result

- Planes
- Trains
- Automobiles

The enumerate environment

L^AT_EX code

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

Typeset result

1. Planes
2. Trains
3. Automobiles

Adjusting font attributes

L^AT_EX code

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

Typeset result

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

Formatting tables

LaTeX code

```
\begin{tabular}{|c|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

Typesetting mathematics

- 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
... $\[mathematics text \]$...

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

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

Typeset result

$$2^{a+b}$$

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

$$2^{2^n}$$

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

Aligning multi-line equations

LaTeX code

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

Typeset result

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

$$= a^2 - b^2$$

Aligning multi-line equations with side notes

LaTeX code

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

Typeset result

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

$$= a^2 - b^2$$

Side notes

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}
```

LaTeX 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

$\alpha \beta \gamma \delta \epsilon$

LaTeX code

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

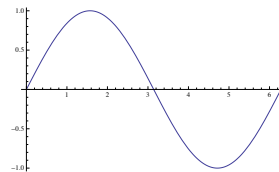
Typeset result

$\Gamma \Delta \Theta \Sigma \Omega$

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.

To do . . .

Typeset the sample page

Refer to Appendix B of Grätzer's book