LaTeX

Introduction to LaTeX

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Overview

- 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?
  TeXLive DVD or TeX Users Group online
- How do I learn to use it?
  Reference manuals/books, online sources, ...

Learning about LaTeX

- 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 TeX front-ends

TeXShop
Mac

TeXworks
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:

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


LaTeX command syntax

```
\command[optional]{required}

  or

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

Examples:

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


LaTeX environments

```
\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

LaTeX code

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

Typeset result

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

Formatting tables

LaTeX code

```
\begin{tabular}{l|c|r}
President       & Party      & Term \\ \hline \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

$x^2 + y^2$

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

$\int_0^\pi x^2 dx$

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

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

LaTeX 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}
```

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   \not\in
```

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
```

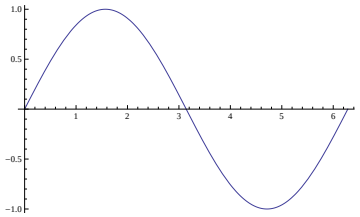
Typeset result

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.

To do...

Typeset the sample page

Refer to Appendix B of Grätzer's book