

Very Basic Mathematical Latex

A document in the article style might be entered between the `\maketitle` and `\end{document}` sections below.

```
\documentclass{article}
%\addtolength{\textheight}{+ .1\textheight}
\title{TITLE}
\author{NAME}
%\date{}

\begin{document}

\maketitle

\end{document}
```

Paragraphs are separated by a blank line of input. Lines which start with `%` are viewed as having been commented out.

Most mathematical input is entered in `math` mode. Displayed formulas can be enclosed between `\[` and `\]`; inline formulas between `$` and `$`. A number of examples are given below.

You can find long lists of mathematical symbols and accents at the web sites:

- <http://www.agu.org/symbols.html>
- <http://www.giss.nasa.gov/latex/ltx-117.html>
- <http://omega.albany.edu:8008/Symbols.html>
- <http://www.lacim.uqam.ca/~zabrocki/LATEXmath/latexsym.html>

Simple Constructions in Math Mode

Some Simple Displayed Formulas:

The character `^` is for superscripts and `_` is for subscripts. Single character subscripts don't need to be enclosed in `{}`.

$$e^{i\theta_1} = \cos \theta_1 + i \sin \theta_1$$

```
e^{ i \theta_1} = \cos{\theta_1} + i \sin{\theta_1}
```

$$\frac{\partial^2 u}{\partial x^2} = \frac{1}{c^2} \frac{\partial^2 u}{\partial t^2}$$

```
\[
\frac{\partial^2 u}{\partial x^2} =
\frac{1}{c^2} \frac{\partial^2 u}{\partial t^2}
\]
```

Sometimes it is important not to leave a blank line before the `\]` ending a math mode display.

Formulas can also be displayed inline by enclosing in `$` signs; e.g. $f(x) = \frac{d}{dx} \int_a^x f(t) dt$.

```
$f(x) = \frac{d}{dx} \int_a^x f(t) \ dt$
```

Matrices, Systems of Equations, Tables:

A Matrix

$$A = \begin{pmatrix} a & b \\ b & c \end{pmatrix}.$$

```
\[
A = \left( \begin{array}{rr} a & b \\ b & c \end{array} \right).
\]
```

The `r`'s indicate *right* justification. Alternatives include `l` or `c`.

A system of equations:

$$\begin{aligned} u \cos(\pi u^3) + v + 1 &= x \\ u + v^2 \cos(\pi v) + 1 &= y \end{aligned}$$

```
\begin{eqnarray*}
u \cos \{(\pi u^3)\} + v + 1 &=& x \\
u + v^2 \cos \{(\pi v)\} + 1 &=& y
\end{eqnarray*}
```

A Simple Table:

T	probability
2	$\frac{1}{36}$
3	$\frac{2}{36}$

```
\begin{table}[h]
\begin{center}
\begin{tabular}{r|c}
 $\mathbf{T}$  &  $\mathbf{probability}$  \\ \hline
2 &  $\frac{1}{36}$  \\
3 &  $\frac{2}{36}$ 
\end{tabular}
\end{center}
\end{table}
```

The vertical bars | and \hline commands control where horizontal and vertical lines appear in the table.

A Conditional Defintion

$$f(x, y) = \begin{cases} \frac{x^2y}{x^4+y^2} & \text{if } (x, y) \neq (0, 0) \\ 0 & \text{if } (x, y) = (0, 0) \end{cases}$$

```
\[
f(x,y)= \left\{ \begin{array}{ll}
\frac{x^2y}{x^4+y^2} & \mbox{if } (x,y) \neq (0,0) \\
0 & \mbox{if } (x,y) = (0,0)
\end{array} \right.
\]
```

The \right. command closes the left delimiter \left syntactically without displaying anything.

Lists

The *itemize* environment:

- item1
- item2

```
\begin{itemize}
  \item item1
  \item item2
\end{itemize}
```

The *enumerate* environment:

1. item1
2. item2

```
\begin{enumerate}
  \item item1
  \item item2
\end{enumerate}
```

The *description* environment:

- a) item1
- b) item2

```
\begin{description}
  \item[{\bf a} ] item1
  \item[{\bf b} ] item2
\end{description}
```

(The example above chooses to use boldface for the labels.)

Alignment, Font and Size Changes

Alignment

can be forced with

- **left:** `\noindent`
- **center:** `\begin{ center} ... \end{ center}`
- **right:** `\begin{ flushright} ... \end{ flushright}`
- **newline:** `\newline` or `\\`
- **newpage:** `\newpage`

Text Size

You can change sizes by enclosing your text in brackets as in

tiny: `{\tiny ...}`.

small: `{\small ...}`.

large: `{\large ...}`.

large: `{\Large ...}`.

large: `{\LARGE ...}`.

Font Changes

are possible as in

boldface: `{\bf ...}`.

italics: `{\it ...}`.

Vertical Spacing

can be achieved by commands like `\bigskip`, `\smallskip`, or `\vspace{5mm}`.