



TeX

Tables and Arrays

Tables

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Arrays

$$\begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix}$$

The Table and Tabular Environments

Table Environment

Usually reserved for academic writing.
Creates a labeled Table, such as Table 1.1.

```
\begin{table}
  \caption{Table Title}
  \begin{tabular}{cc}
    ...
  \end{tabular}
\end{table}
```

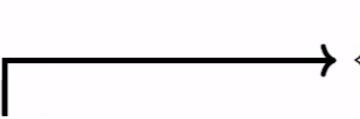
Tabular Environment

General environment for making tables.

```
\begin{tabular}{cc}
  ...
\end{tabular}
```

The Tabular Environment

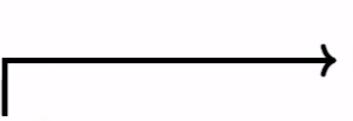
```
\begin{tabular}{ alignment }  
    Tabular Code  
\end{tabular}
```

 → { 3 Columns
Left justified, center justified, right justified

```
\begin{tabular}{lcr}  
    \end{tabular}
```

The Tabular Environment

```
\begin{tabular}{ alignment }
    Tabular Code
\end{tabular}
```

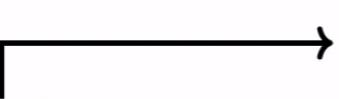
 → { 3 Columns
Left justified, center justified, right justified

```
\begin{tabular}{lcr}
    text & text & text \\
    l     & c     & r
\end{tabular}
```

& moves to the next cell
\& starts a new row

The Tabular Environment

```
\begin{tabular}{ alignment }
    Tabular Code
\end{tabular}
```

 → { 3 Columns
Left justified, center justified, right justified

```
\begin{tabular}{lcr}
    text & text & text \\
    l     & c     & r
\end{tabular}
```

& moves to the next cell
\& starts a new row

text	text	text
l	c	r

The Tabular Environment

```
\begin{tabular}{ alignment }
    Tabular Code
\end{tabular}
```

```
\begin{tabular}{lcr}
    text & text & text \\
    l     & c     & r
\end{tabular}
```

text text text
l c r

```
\begin{tabular}{|l c|l r|}
    text & text & text \\
    l     & c     & r
\end{tabular}
```

text	text		text
l	c		r

The Tabular Environment

```
\begin{tabular}{ alignment }
    Tabular Code
\end{tabular}
```

```
\begin{tabular}{lcr}
    text & text & text \\
    l    & c    & r
\end{tabular}
```

text text text
l c r

```
\begin{tabular}{|l c||r|}
    text & text & text \\
    l    & c    &
\end{tabular}
```

text	text	text
l	c	

The Tabular Environment

```
\begin{tabular}{ alignment }  
    Tabular Code  
\end{tabular}
```

```
\begin{tabular}{lcr}  
    text & text & text \\  
    l     & c     & r  
\end{tabular}
```

text text text
l c r

```
\begin{tabular}{|l c| r|}  
    \hline  
    text & text & text \\  
    l     & c     & r \\  
    \hline  
\end{tabular}
```

text	text	text
l	c	

The Tabular Environment

```
\begin{tabular}{ alignment }
    Tabular Code
\end{tabular}
```

```
\begin{tabular}{lcr}
    text & text & text \\
    l    & c    & r
\end{tabular}
```

text text text
l c r

```
\begin{tabular}{|l c||r|}
\hline
    text & text & text \\
    r    & c    & \\
\hline \hline
\end{tabular}
```

text	text	text
l	c	

Fixed Column Widths

```
\begin{tabular}{|c|}  
  \hline  
  This much text makes the cell very wide and problematic \\  
  \hline  
  \end{tabular}
```

This much text makes the cell very wide and problematic

Something like
this may be
preferable

Additional Table Packages

`\usepackage{booktabs}`

Provides extra commands to make
tables more attractive

The documentation also provides
general guidelines for making tables

`\usepackage{tabularx}`

Another way of controlling the
width of columns

`\usepackage{colortbl}`

Add color to your table, including
line colors and cell background colors

`\usepackage{longtable}`

Create tables that span across
multiple pages

The Array Environment

Arrays must be in math mode.

```
\begin{array}{ alignment }
  Array Code
\end{array}
```

```
\begin{array}{ccc}
  a_{11} & a_{12} & a_{13} \\
  a_{21} & a_{22} & a_{23}
\end{array}
```

$$\begin{array}{ccc} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \end{array}$$

```
\begin{array}{c|cc}
  a_{11} & a_{12} & a_{13} \\
  \hline
  a_{21} & a_{22} & a_{23}
\end{array}
```

a_{11}	a_{12}	a_{13}
a_{21}	a_{22}	a_{23}

Matrices

```
\left( \begin{array}{ccc}
a_{11} & a_{12} & a_{13} \\
a_{21} & a_{22} & a_{23}
\end{array} \right)
```

```
\left[ \begin{array}{ccc}
a_{11} & a_{12} & a_{13} \\
a_{21} & a_{22} & a_{23}
\end{array} \right]
```

Matrices

```
\left( \begin{array}{ccc}
a_{11} & a_{12} & a_{13} \\
a_{21} & a_{22} & a_{23}
\end{array} \right)
```

```
\left[ \begin{array}{ccc}
a_{11} & a_{12} & a_{13} \\
a_{21} & a_{22} & a_{23}
\end{array} \right]
```

```
\begin{pmatrix}
a_{11} & a_{12} & a_{13} \\
a_{21} & a_{22} & a_{23}
\end{pmatrix}
```

```
\begin{bmatrix}
a_{11} & a_{12} & a_{13} \\
a_{21} & a_{22} & a_{23}
\end{bmatrix}
```

Dots and Matrices

```
\begin{pmatrix}
  a_{11} & a_{12} & \cdots \\
  a_{21} & a_{22} & \cdots \\
  \vdots & \vdots & \ddots
\end{pmatrix}
```

```
\vdots
\cdots
\ddots
```

$$\begin{pmatrix} a_{11} & a_{12} & \cdots \\ a_{21} & a_{22} & \cdots \\ \vdots & \vdots & \ddots \end{pmatrix}$$

```
\usepackage{mathdots}
\iddots
```

Merging Columns and Rows

```
\multicolumn{ num_cols }{ alignment }{ contents }

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

\hline
Very Long Text & Very Long Text & Very Long Text \\
\hline
\multicolumn{3}{|c|}{Center Merged} \\
\hline
Text & \multicolumn{2}{|l|}{Left Aligned Merged} \\
\hline
\end{tabular}
```

Very Long Text	Very Long Text	Very Long Text
Center Merged		
Very Long Text	Left Aligned Merged	

Functions

Polynomials

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0$$

Exponentials

$$f(x) = c_1 e^{r_1 x} + c_2 e^{r_2 x}$$

Functions

Polynomials

`f(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0`

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0$$

Exponentials

`f(x) = c_1 e^{r_1 x} + c_2 e^{r_2 x}`

$$f(x) = c_1 e^{r_1 x} + c_2 e^{r_2 x}$$

Special Functions

Visual Difference

	Example Code	Output
Special Function	<code>\sin(x)</code>	$\sin(x)$
Without	<code>sin(x)</code>	$sin(x)$

Limit Example

```
\lim_{x \rightarrow \infty} \frac{x^2 + 1}{x^2 - 1} = 1
```

Display Style

$$\lim_{x \rightarrow \infty} \frac{x^2 + 1}{x^2 - 1} = 1$$

Inline Style

$$\lim_{x \rightarrow \infty} \frac{x^2 + 1}{x^2 - 1} = 1$$

Summation Example

$$\sum_{n=1}^{\infty} \frac{1}{n}$$

Display Style

$$\sum_{n=1}^{\infty} \frac{1}{n}$$

Inline Style

$$\sum_{n=1}^{\infty} \frac{1}{n}$$

$$\sum_{\substack{n=0 \\ n \text{ odd}}}^{\infty} a_n x^n$$

Display Style

$$\sum_{\substack{n=0 \\ n \text{ odd}}}^{\infty} a_n x^n$$

Inline Style

$$\sum_{\substack{n=0 \\ n \text{ odd}}}^{\infty} a_n x^n$$

Integrals

Single Integral \int

Double Integral \iint

Triple Integral \iiint

Iterated vs. Multiple

Iterated Integral $\int_0^\infty \int_0^\infty$

Multiple Integral \iint_R

Upper/Lower Limit Location

`\textstyle \int_0^\infty`

$\rightarrow \int_0^\infty$

`\displaystyle \int_0^\infty`

$\rightarrow \int_0^\infty$

`\textstyle \int \limits_0^\infty` $\rightarrow \int_0^\infty$

`\displaystyle \int \limits_0^\infty` $\rightarrow \int_0^\infty$

More Integrals

$$\int f(x) dx$$

A little tight 

$$\int f(x) dx$$

A little separation 

`\int f(x) dx`

`\int f(x) \, dx`

$$\iiint f(x, y, z) dx dy dz$$

`\iiint f(x, y, z) dx dy dz`

$$\iiint f(x, y, z) dx dy dz$$

`\iiint f(x, y, z) \, dx \, dy \, dz`

Spacing Commands

`f(x) dx`

`f(x) \, dx`

`f(x) \: dx`

`f(x) \; dx`

`f(x) \quad dx`

`f(x)dx`

`f(x)dx`

`f(x) dx`

`f(x) dx`

`f(x) dx`

Even More Integrals

$$\int f(x) dx$$

```
\int f(x) \, dx
```

$$\int f(x) \, dx$$

```
\int f(x) \, \mathrm{d}x
```

$$\frac{d}{dx} \left(\frac{dy}{dx} \right)$$

```
\frac{d}{dx} \left( \frac{dy}{dx} \right)
```

$$\frac{d}{dx} \left(\frac{dy}{dx} \right)$$

```
\frac{\mathrm{d}}{\mathrm{d}x} \left( \frac{\mathrm{d}y}{\mathrm{d}x} \right)
```

Last Page of Integrals

$$\text{\textstyle } \int_a^b f(x) dx = F(x) \bigg|_a^b$$

$$\int_a^b f(x) dx = F(x) \bigg|_a^b$$

$$\text{\textstyle } \int_a^b f(x) dx = F(x) \bigg|_a^b$$

$$\int_a^b f(x) dx = F(x) \bigg|_a^b$$

Derivatives

$$\frac{df}{dx}$$

`\frac{\mathrm{d}f}{\mathrm{d}x}`

$$\frac{\partial f}{\partial x}$$

`\frac{\partial f}{\partial x}`

Prime (Lagrangian) Notation

LATEXCode Output

$$f'(x)$$

$$f''(x)$$

$$f'''(x)$$

$$f^{(n)}(x)$$

$$f''(x)$$

$$f''(x)$$

Dot (Newtonian) Notation

LATEXCode Output

$$\dot{x}(t)$$

$$\ddot{x}(t)$$

$$\dddot{x}(t)$$

$$\ddot{\ddot{x}}(t)$$

Vectors

$$\vec{r}(t) = \langle x(t), y(t), z(t) \rangle$$

```
\vv{r}(t) = \langle x(t), y(t), z(t) \rangle
```

```
\usepackage{bm}
```

```
\bm{r}(t) \quad \mathbf{r}(t)
```

```
\usepackage{esvect}
```

```
\vv{r}(t) \quad \vec{r}(t)
```

Other Symbols

$\overrightarrow{\text{proj}}$

\vec{v}_1

\vec{v}_1

Symbol $\int \times \frac{1}{2}$

$\text{vv}\{\text{proj}\} \quad \text{vv}\{v_1\} \quad \text{vv}\{v\}\{1\}$

Regular $\int \times \frac{1}{2}$

Bold $\int \times \frac{1}{2}$

Faraday's Law of Induction

$$\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$$

$$\nabla \times E = - \frac{\partial B}{\partial t}$$

$$\oint \vec{E} \cdot d\vec{s} = \frac{d\Phi_B}{dt}$$

$$\oint E \cdot ds = \frac{d\Phi_B}{dt}$$