Math & Tables

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Math environment

This section will cover how to typeset mathematics. It will also cover how to handle complicated equations and multiple equation environments. There are a few ways to enter math mode, however the most common is Inline math mode : $ ... $
Display math mode \[...\]

Math environment

Method	Special Characteristics	Usage
\$....\$	None	In-line math
\begin{equation}	Goes to a newline and center equation with label	Equations
\end{equation}		
\[....\]	Goes to a newline and center equation	Equations with no label

Math Symbols I

Symbol Name	LaTeX Command	Rendering
Fraction	\frac{x}{y}	$\frac{x}{y}$
In-line Fraction	\dfrac{x}{y}	$\dfrac{x}{y}$
Greek Letters	\alpha \beta \gamma	$\alpha \beta \gamma$
Integral	\int_a^ b \iint \oint	$\int_a^b \iint \oint$
Properly sized parentheses	\left(\dfrac{a}{b}\right)	$\left(\dfrac{a}{b}\right)$
Summations	\sum_{n=1}^ \infty	$\sum_{n=1}^{\infty}$
Superscript	x^ y	x^y
Subscript	x_ y	x_y
Overbrace	\overbrace{ 1+2+\cdots+100 }^ {5050}	$\overbrace{1+2+\cdots+100}^{5050}$

Math Symbols II

https://kogler.wordpress.com/2008/03/21/latex-use-of-math-symbols-formulas-and-equations/

Equation

```
\begin{equation}
f(x) = x^ 2
\end{equation}
```

$$f(x) = x^2 \tag{1}$$

```
\begin{equation*}
f(x) = x^ 2
\end{equation*}
```

$$f(x) = x^2$$

Multiline Equations

You can present equations with several lines, using the array statement. Inside its declaration you must :

- Define the number of columns
- Define column alignment
- Define column indentation
- Indicate column separator with & symbol &

Example: lcr means: 3 columns with indentations respectively left, center and right

```
\[
$ \vert x \vert $ = \left{
\begin{array}{ll} x & \mbox {if $x \geq 0$};
-x & \mbox{if $x < 0$}\end{array}
\right
\]
```

$$|x| = \begin{cases} x & \text{if } x \geq 0; \\ -x & \text{if } x < 0. \end{cases}$$

```
\begin{eqnarray}
x&=&v+6b-f \\
&=&(p+q)(p-q) \\
&=&p^ 2-q^ 2 \\
\end{eqnarray}
```

$$\begin{aligned} x &= v + 6b - f && (2)\\ &= (p+q)(p-q) && (3)\\ &= p^2 - q^2 && (4) \end{aligned}$$

$f(t)$	$F(s)$	Remark
$\delta(t)$	1	impulse function
$u(t)$	$\frac{1}{s}$	unit step function
$e^{at}u(t)$	$\frac{1}{s-a}$	one-sided exponential

matrices

```
\[
\left(
\begin{array}{ccc}
a & b & c \\
d & e & f \\
g & h & i \\
\end{array}
\right)
\]
```

$$\left(\begin{array}{ccc} a & b & c \\ d & e & f \\ g & h & i \\ \end{array} \right)$$

```
\[\begin{bmatrix} \\
a_{11}&a_{12}&\cdots &a_{1n} \\
a_{21}&a_{22}&\cdots &a_{2n} \\
\vdots & \vdots & \ddots & \vdots\\
a_{n1}&a_{n2}&\cdots &a_{nn}
\end{bmatrix}\]
```

$$\begin{bmatrix} \\ a_{11}&a_{12}&\cdots &a_{1n} \\ a_{21}&a_{22}&\cdots &a_{2n} \\ \vdots & \vdots & \ddots & \vdots\\ a_{n1}&a_{n2}&\cdots &a_{nn} \end{bmatrix}$$

```
\begin{pmatrix}
x & y
z & v
\end{pmatrix}
```

$$\begin{pmatrix} x & y \\ z & v \end{pmatrix}$$

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Tables
- Table Enviroment

Table Enviroment[1]

Tables can be a very efficient way to present information.

```
\begin{tabular}{l|c}
Name&Salary\\
\hline
Mark&$250,000\\
Carly&$80,000\\
Carter&$25,000\\
Sam&$50,000
\end{tabular}
```

Name	Salary
Mark	$250,000
Carly	$80,000
Carter	$25,000
Sam	$50,000

[1] https://www.latex-tutorial.com/tutorials/tables/Template

Landscape

Name	Salary	Likes	Children
Mark	$250,000	windsurfing and jumping on trampolines	Amy, John, and Ray
Carly	$80,000	heavy metal music, Paris, and dancing in the rain	Tyra
Carter	$25,000	candy, fast cars that he cannot afford and Ramen	None
Sam	$50,000	painting, motorcycles, and Reddit	Kyle and Sam Jr.

and

Multi Row

```
\multirow{NUMBER_OF_ROWS}{WIDTH}{CONTENT}
```

Table: Multirow table.

Value 1	**Value 2**	**Value 3**
α	β	γ
12	1110.1	a
	10.1	b
3	23.113231	c
4	25.113231	d

Multi Column

```
\multicolumn{NUMBER_OF_COLUMNS}{ALIGNMENT}{CONTENT}
```

Country Name or Area Name	Country List		
	ISO ALPHA 2 Code	ISO ALPHA 3 Code	ISO numeric Code
Afghanistan	AF	AFG	004
Aland Islands	AX	ALA	248
Albania	AL	ALB	008
Algeria	DZ	DZA	012
American Samoa	AS	ASM	016
Andorra	AD	AND	020
Angola	AO	AGO	024

Partition

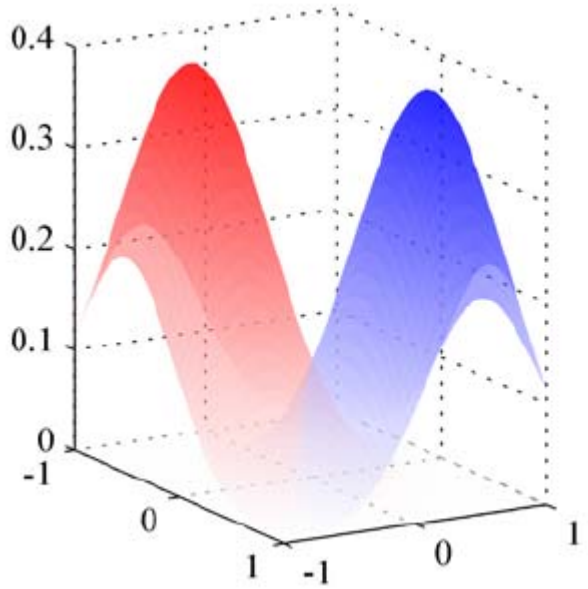

Figure: Class-conditional densities for two classes

$$\begin{pmatrix} 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ t & -r^* & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ r & t* & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \end{pmatrix}. \quad (5)$$

Multipage

```
\usepackage{longtable} % To display tables on several pages
```

: Multipage table.

Value 1 α	**Value 2** β	**Value 3** γ
1	1110.1	a
2	10.1	b
3	23.113231	c

Table from .csv file

```
\usepackage{pgfplotstable} % Generates table from .csv
```

Table: Autogenerated table from .csv file.

*Value*1	*Value*2
1	2
11.432	2342.23123123

Caption, Referencing I

```
\begin{table}[h!]
\begin{center}
\caption{Your first table.}
\label{tab:table1}
\begin{tabular}{l|c|r}
\textbf{Value 1} & \textbf{Value 2} & \textbf{Value 3}\\
$\alpha$ & $\beta$ & $\gamma$ \\
\hline
1 & 1110.1 & a\\
2 & 10.1 & b\\
3 & 23.113231 & c\\
\end{tabular}
\end{center}
\end{table}
```

Caption, Referencing II

Table: Your table.

Value 1	**Value 2**	**Value 3**
α	β	γ
1	1110.1	a
2	10.1	b
3	23.113231	c

Information is shown in the Table 4.

```
Information is shown in the Table \ref{tab:table3}.
```

Positioning

h
Will place the table here approximately.
t
Position the table at the top of the page.
b
Position the table at the bottom of the page.
p
Put the table in a special page, for tables only.
!
Override internal LaTeX parameters.
H
Place the table at this precise location, pretty much like h!.