

# $\text{\LaTeX}$ - Soạn thảo các tài liệu kỹ thuật

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# Các toán tử

Các toán tử cơ bản là hàm với 1 từ (sin, cos, tan, log, exp, ...)

$$\sin^2 \alpha + \log x + \exp \beta$$

```
1 \[  
2   \sin^2 \alpha + \log x + \exp \beta  
3 \]
```

Toán tử giới hạn (lim)

Limit  $\lim_{x \rightarrow \infty} f(x)$  inside text

$$\lim_{x \rightarrow \infty} f(x)$$

```
1 Limit $\lim_{x \to \infty} f(x)$ inside text  
2 $$\lim_{x \to \infty} f(x)$$
```

# Tổng và tích

## Tổng

Sum  $\sum_{n=1}^{\infty} 2^{-n} = 1$  inside text

$$\sum_{n=1}^{\infty} 2^{-n} = 1$$

1 Sum  $\sum_{n=1}^{\infty} 2^{-n} = 1$  inside text

2  $\sum_{n=1}^{\infty} 2^{-n} = 1$

2  $\sum_{n=1}^{\infty} 2^{-n} = 1$

## Tích

Product  $\prod_{i=a}^b f(i)$  inside text

$$\prod_{i=a}^b f(i)$$

1 Product  $\prod_{i=a}^b f(i)$  inside text

2  $\prod_{i=a}^b f(i)$

# Tích phân

Integral  $\int_a^b x^2 dx$  inside text

$$\int_a^b x^2 dx$$

- 1 Integral  $\int_a^b x^2 dx$  inside text
- 2  $\int_a^b x^2 dx$

Tích phân nhiều lớp (sử dụng  $\int$  limits)

$$\iint_V \mu(u, v) du dv$$

$$\iiint_V \mu(u, v, w) du dv dw$$

$$\iiint_V \mu(t, u, v, w) dt du dv dw$$

$$\int \cdots \int_V \mu(u_1, \dots, u_k) du_1 \dots du_k$$

- 1  $\iint_V \mu(u, v) du dv$
- 2  $\iiint_V \mu(u, v, w) du dv dw$
- 3  $\iiint_V \mu(t, u, v, w) dt du dv dw$
- 4  $\int \cdots \int_V \mu(u_1, \dots, u_k) du_1 \dots du_k$

# Phân số và nhị thức

Fraction and Binomial coefficient

$$\frac{n!}{k!(n-k)!} = \binom{n}{k} \text{ inside text}$$

$$\frac{n!}{k!(n-k)!} = \binom{n}{k}$$

1 Fraction and Binomial

coefficient  $\frac{n!}{k!(n-k)!} = \text{\texttt{\textbackslash binom\{n\}\{k\}}}$   
inside text

2  $\frac{n!}{k!(n-k)!} = \text{\texttt{\textbackslash binom\{n\}\{k\}}}$

Phân số trong phân số (sử dụng  $\text{\texttt{\textbackslash tfrac}}$  hay  $\text{\texttt{\textbackslash dfrac}}$  để buộc phân số ở dạng  $\text{\texttt{textstyle}}$  hay  $\text{\texttt{displaystyle}}$ )

$$\frac{\frac{1}{x} + \frac{1}{y}}{y - z}$$

1  $\frac{\frac{1}{x} + \frac{1}{y}}{y - z}$

Có thể sử dụng chỉ số trên và dưới

$$^3/_7$$

1  $^3/_7$

# Phân số sử dụng gói `xfrac`

Take  $\frac{1}{2}$  cup of sugar, ...

$$3 \times \frac{1}{2} = 1\frac{1}{2}$$

Take  $\frac{1}{2}$  cup of sugar, ...

$$3 \times \frac{1}{2} = 1\frac{1}{2}$$

1 Take  $\frac{1}{2}$  cup of  
sugar, \dots

2  
3  $3 \times \frac{1}{2} = 1\frac{1}{2}$

4  
5 Take  $\frac{1}{2}$  cup of sugar,  
\dots

6  
7  $3 \times \frac{1}{2} = 1\frac{1}{2}$

# Phân số liên tục

$$x = a_0 + \frac{12356616316}{a_3 + \frac{16565}{a_3 + \frac{165465465}{a_9 + \frac{1131321}{a_7}}}}$$

```
1 \begin{equation*}
2 x = a_0 + \cfrac
3   {12356616316}{a_3
4   + \cfrac{16565}{a_3 +
5     \cfrac{165465465}{a_9 +
      \cfrac{1131321}{a_7}
      } } }
\end{equation*}
```



# Căn số

$$\sqrt{\frac{a}{b}}$$

$$\sqrt[n]{1+x+x^2+x^3+\dots+x^n}$$

1  $\sqrt{\frac{a}{b}}$

2  $\sqrt[n]{1+x+x^2+x^3+\dots+x^n}$

# Dấu ngoặc và dấu phân cách

$$(a), [b], \{c\}, \\ |d|, \|e\|, \langle f \rangle, \\ \lfloor g \rfloor, \lceil h \rceil, \\ \lceil i \rceil$$

```
1 \begin{align*}
2 ( a ), [ b ], \{ c \}, \\
3 | d |, \| e \|, \lceil f \rceil, \\
4 \lfloor g \rfloor, \lceil h \rceil, \\
5 \ulcorner i \urcorner \\
6 \end{align*}
```

Tự động thay đổi kích thước với các lệnh `\left`, `\right` và `\middle`

$$P\left(A=2\middle|\frac{A^2}{B}>4\right) \\ \left\{\frac{x^2}{y^3}\right\}$$

```
1 $$P\left(A=2\middle|\frac{A^2}{B}>4\right)$$
2 $$\left\{\frac{x^2}{y^3}\right\}
```

# Thay đổi kích thước dấu ngoặc trực tiếp

((( ( (

$$\frac{d}{dx}(kg(x))$$

$$\frac{d}{dx}(kg(x))$$

1 `$( \big( \Big( \bigg( \Bigg(`  
`($$`

2 `$$\frac{\mathrm d}{\mathrm d`  
`x} \left( k g(x) \right`  
`$$$$`

3 `$$\frac{\mathrm d}{\mathrm d`  
`x} \big( k g(x) \big)$$$$`

# Ma trận

$$\begin{matrix} a & b & c \\ d & e & f \\ g & h & i \end{matrix}$$

```
1 \[
2 \begin{matrix}
3 a & b & c \\
4 d & e & f \\
5 g & h & i
6 \end{matrix}
7 \]
```

Để căn trái/giữa/phải các cột, sử dụng phiên bản với dấu sao (\*)

$$\begin{matrix} -1 & 3 \\ 2 & -4 \end{matrix} = \begin{matrix} -1 & 3 \\ 2 & -4 \end{matrix}$$

```
1 \[ \begin{matrix}
2 -1 & 3 \\
3 2 & -4
4 \end{matrix}
5 =
6 \begin{matrix*}[r]
7 -1 & 3 \\
8 2 & -4
9 \end{matrix*}
\]
```

# Một số môi trường ma trận

Tên môi trường	Dấu phân cách
<code>pmatrix</code>	$()$
<code>bmatrix</code>	$[]$
<code>Bmatrix</code>	$\{ \}$
<code>vmatrix</code>	$   $
<code>Vmatrix</code>	$     $

Thí dụ:

$$\begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix}$$

```
1 \[
2 \begin{pmatrix}
3 a & b & c \\
4 d & e & f \\
5 g & h & i
6 \end{pmatrix}
7 \]
```

# Sử dụng cdots, vdots, ddots trong ma trận

$$A_{m,n} = \begin{bmatrix} a_{1,1} & a_{1,2} & \cdots & a_{1,n} \\ a_{2,1} & a_{2,2} & \cdots & a_{2,n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m,1} & a_{m,2} & \cdots & a_{m,n} \end{bmatrix}$$

```
1 \[
2 A_{\{m,n\}} =
3 \begin{bmatrix}
4     a_{\{1,1\}} & a_{\{1,2\}} & \backslash
        cdots & a_{\{1,n\}}
        \\
5     a_{\{2,1\}} & a_{\{2,2\}} & \backslash
        cdots & a_{\{2,n\}}
        \\
6     \vdots & \vdots & \backslash
        ddots & \vdots
        \\
7     a_{\{m,1\}} & a_{\{m,2\}} & \backslash
        cdots & a_{\{m,n\}}
8 \end{bmatrix}
9 \]
```

# Tăng khoảng cách dòng trong ma trận

$$M = \begin{bmatrix} \frac{5}{6} & \frac{1}{6} & 0 \\ \frac{5}{6} & 0 & \frac{1}{6} \\ 0 & \frac{5}{6} & \frac{1}{6} \end{bmatrix}$$

$$M = \begin{bmatrix} \frac{5}{6} & \frac{1}{6} & 0 \\ \frac{5}{6} & 0 & \frac{1}{6} \\ 0 & \frac{5}{6} & \frac{1}{6} \end{bmatrix}$$

```
1 \[
2 M = \begin{bmatrix}
3 \frac{5}{6} & \frac{1}{6} & 0 \\
4 \frac{5}{6} & 0 & \frac{1}{6} \\
5 0 & \frac{5}{6} & \frac{1}{6}
6 \end{bmatrix}
7 \]
```

# Ma trận với chỉ mục

Chỉ mục/biên

$$M = \begin{matrix} & \begin{matrix} x & y \end{matrix} \\ \begin{matrix} A \\ B \end{matrix} & \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \end{matrix}$$

```
1 \[
2 M=\bordermatrix{~ &x&y \cr
3           A & 1 & 0 \cr
4           B & 0 & 1 \cr}
5 \]
```

Sử dụng `\smallmatrix` cho ma trận trong dòng văn bản

A matrix in text must be set smaller:  
 $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$  to not increase leading in a  
portion of text.

```
1 A matrix in text must be set
  smaller:
2 $\bigl(\begin{smallmatrix}
3 a&b \\
4 \end{smallmatrix}\bigr)$
5 to not increase leading in a
  portion of text.
```



# Mảng

1	2
3	4

```
1 \[  
2 \begin{array}{c|c}  
3 1 & 2 \\ \hline  
4 3 & 4  
5 \end{array}  
6 \]
```

## Chèn text vào biểu thức toán

$$5\textit{apples} \times 10\textit{apples} = \textit{lotsofapples}^2$$

```
1 \[
2 5 apples \times 10 apples =
   lots of apples^2
3 \]
```

Sử dụng `\text`

$$5\text{apples} \times 10\text{apples} = \text{lots of apples}^2$$

```
1 \[
2 5 \text{apples} \times 10 \
   \text{apples}
3 = \text{lots of apples}^2
4 \]
```

Định dạng text

$$5 \text{ apples} \times 10 \textbf{ apples} = \\ \textit{lots of apples}^2$$

```
1 \begin{align*}
2 5 \text{trm{ apples} } \times 10
3 \textbf{ apples} = \\
4 \textit{lots of apples}^2
5 \end{align*}
```

# Định dạng ký hiệu toán

Lệnh	Thí dụ
<code>\mathnormal {...}</code>	$ABCDEFabcdef123456$
<code>\mathrm {...}</code>	$ABCDEFabcdef123456$
<code>\mathit {...}</code>	$ABCDEFabcdef123456$
<code>\mathbf {...}</code>	<b><math>ABCDEFabcdef123456</math></b>
<code>\mathsf {...}</code>	$ABCDEFabcdef123456$
<code>\mathtt {...}</code>	$ABCDEFabcdef123456$
<code>\mathfrak {...}</code>	$\mathfrak{ABCDEFabcdef123456}$
<code>\mathcal {...}</code>	$\mathcal{ABCDEF}$
<code>\mathbb {...}</code>	$\mathbb{ABCDEF}$
<code>\mathscr {...}</code>	$\mathscr{ABCDEF}$

Boldsymbol

$$\beta = (\beta_1, \beta_2, \dots, \beta_n)$$

```
1 $$\boldsymbol{\beta} = (\beta_1, \beta_2, \dots, \beta_n)$$
```

# Các dấu mũ

Lệnh	Thí dụ	Lệnh	Thí dụ
$a'$ hoặc $a^{\prime}$	$a'$	$a''$	$a''$
$\hat{a}$	$\hat{a}$	$\bar{a}$	$\bar{a}$
$\grave{a}$	$\grave{a}$	$\acute{a}$	$\acute{a}$
$\dot{a}$	$\dot{a}$	$\ddot{a}$	$\ddot{a}$
$\not{a}$	$\not{a}$	$\mathring{a}$	$\mathring{a}$
$\overrightarrow{a}$	$\overrightarrow{a}$	$\overleftarrow{a}$	$\overleftarrow{a}$
$a'''$	$a'''$	$a''''$	$a''''$
$\overline{aaa}$	$\overline{aaa}$	$\check{a}$	$\check{a}$
$\breve{a}$	$\breve{a}$	$\vec{a}$	$\vec{a}$
$\dddot{a}$	$\dddot{a}$	$\ddddot{a}$	$\ddddot{a}$
$\widehat{AAA}$	$\widehat{AAA}$	$\widetilde{AAA}$	$\widetilde{AAA}$
$\tilde{a}$	$\tilde{a}$	$\underline{a}$	$\underline{a}$

# Mẫu và các dấu cộng/trừ

Sử dụng gói **xcolor**

$$k = \textcolor{red}{x} - 2$$

```
1 \[
2 k = {\color{red}x} \mathbin
      {\color{blue}-} 2
3 \]
```

Dấu cộng/trừ

$$\pm$$
$$\mp$$

```
1 $$\pm$$
2 $$\mp$$
```

# Điều khiển khoảng cách ngang

Sử dụng **môi trường cases** , các lệnh **\quad** và **\qquad**

$$f(n) = \begin{cases} n/2 & \text{if } n \text{ is even} \\ -(n+1)/2 & \text{if } n \text{ is odd} \end{cases}$$

```
1 \[ f(n) =  
2 \begin{cases}  
3 n/2 & \quad \quad \quad \text{\text{if } }  
   n \text{\text{ is even}} \\  
4 -(n+1)/2 & \quad \quad \quad \text{\text{if } }  
   n \text{\text{ is odd}} \\  
5 \end{cases}  
6 \]
```

# Điều khiển khoảng cách ngang

Sử dụng  $\backslash,$  ,  $\backslash:$  ,  $\backl;$  và  $\back!$

$$\int y dx$$

$$\int y \, dx$$

$$\int y \, \mathrm{d}x$$

$$\int y \, \mathrm{d}x$$

$$\int y \mathrm{d}x$$

```
1 $$\int y \, \mathrm{d}x$$
```

```
2 $$\int y\,, \, \mathrm{d}x$$
```

```
3 $$\int y\,: \, \mathrm{d}x$$
```

```
4 $$\int y\;; \, \mathrm{d}x$$
```

```
5 $$\int y\! \, \mathrm{d}x$$
```

# Đánh số phương trình

$$f(x) = (x + a)(x + b) \quad (1)$$

```
1 \begin{equation}
2   f(x)=(x+a)(x+b)
3 \end{equation}
```

Sử dụng `\label`, `\ref` hay `\eqref` để gán nhãn và tham chiếu tới các phương trình

$$6^2 - 5 = 36 - 5 = 31 \quad (2)$$

this references equation [2](#).

```
1 \begin{equation} \label{eq:
   someequation}
2   6^2 - 5 = 36-5 = 31
3 \end{equation}
4 this references equation \
   ref{eq:someequation}.
```



# Đánh số phương trình

$$a = bq + r \quad (3)$$

where (3) is true if  $a$  and  $b$  are integers with  $b \neq c$ .

```
1 \begin{equation} \label{eq:
   erl}
2   a = bq + r
3 \end{equation}
4 where \eqref{eq:erl} is true
   if $a$ and $b$ are
   integers with $b \neq c$
   $.
```

# Đánh số phương trình theo các chương, mục

$$L' = L\sqrt{1 - \frac{v^2}{c^2}} \quad (1.1)$$

```
1 \documentclass[12pt]{article
   }
2 \usepackage{amsmath}
3 \numberwithin{equation}{
   subsection}
4 \begin{document}
5     \section*{First
       Section}
6
7     \subsection*{A
       subsection}
8     \begin{equation}
9         L' = {L}{\sqrt{1-\frac{v^2}{c^2}}}
10    \end{equation}
11 \end{document}
```

# Đánh số phương trình con

Maxwell's equations:

$$B' = -\nabla \times E, \quad (1.2a)$$

$$E' = \nabla \times B - 4\pi j, \quad (1.2b)$$

```
1 \begin{subequations}
2   Maxwell's equations:
3   \begin{align}
4     B'&=-\nabla \times E,\\
5     E'&=\nabla \times B-4\pi j
6   \end{align}
7 \end{subequations}
```

# Một số ký hiệu toán học

Relation Symbols

Symbol	Script	Symbol	Script	Symbol	Script	Symbol	Script	Symbol	Script
$<$	<code>&lt;</code>	$>$	<code>&gt;</code>	$=$	<code>=</code>	$\parallel$	<code>\parallel</code>	$\nparallel$	<code>\nparallel</code>
$\leq$	<code>\leq</code>	$\geq$	<code>\geq</code>	$\doteq$	<code>\doteq</code>	$\asymp$	<code>\asymp</code>	$\bowtie$	<code>\bowtie</code>
$\ll$	<code>\ll</code>	$\gg$	<code>\gg</code>	$\equiv$	<code>\equiv</code>	$\vdash$	<code>\vdash</code>	$\dashv$	<code>\dashv</code>
$\subset$	<code>\subset</code>	$\supset$	<code>\supset</code>	$\approx$	<code>\approx</code>	$\in$	<code>\in</code>	$\ni$	<code>\ni</code>
$\subseteq$	<code>\subseteq</code>	$\supseteq$	<code>\supseteq</code>	$\cong$	<code>\cong</code>	$\smile$	<code>\smile</code>	$\frown$	<code>\frown</code>
$\not\subset$	<code>\not\subset</code>	$\not\supset$	<code>\not\supset</code>	$\simeq$	<code>\simeq</code>	$\models$	<code>\models</code>	$\notin$	<code>\notin</code>
$\sqsubset$	<code>\sqsubset</code>	$\sqsupset$	<code>\sqsupset</code>	$\sim$	<code>\sim</code>	$\perp$	<code>\perp</code>	$\mid$	<code>\mid</code>
$\sqsubseteq$	<code>\sqsubseteq</code>	$\sqsupseteq$	<code>\sqsupseteq</code>	$\propto$	<code>\propto</code>	$\prec$	<code>\prec</code>	$\succ$	<code>\succ</code>
$\preceq$	<code>\preceq</code>	$\succeq$	<code>\succeq</code>	$\neq$	<code>\neq</code>	$\sphericalangle$	<code>\sphericalangle</code>	$\measuredangle$	<code>\measuredangle</code>

# Một số ký hiệu toán học (tiếp)

Binary Operations

Symbol	Script	Symbol	Script	Symbol	Script	Symbol	Script
$\pm$	<code>\pm</code>	$\cap$	<code>\cap</code>	$\diamond$	<code>\diamond</code>	$\oplus$	<code>\oplus</code>
$\mp$	<code>\mp</code>	$\cup$	<code>\cup</code>	$\triangle$	<code>\bigtriangleup</code>	$\ominus$	<code>\ominus</code>
$\times$	<code>\times</code>	$\uplus$	<code>\uplus</code>	$\nabla$	<code>\bigtriangledown</code>	$\otimes$	<code>\otimes</code>
$\div$	<code>\div</code>	$\sqcap$	<code>\sqcap</code>	$\triangleleft$	<code>\triangleleft</code>	$\oslash$	<code>\oslash</code>
$*$	<code>\ast</code>	$\sqcup$	<code>\sqcup</code>	$\triangleright$	<code>\triangleright</code>	$\odot$	<code>\odot</code>
$\star$	<code>\star</code>	$\vee$	<code>\vee</code>	$\bigcirc$	<code>\bigcirc</code>	$\circ$	<code>\circ</code>
$\dagger$	<code>\dagger</code>	$\wedge$	<code>\wedge</code>	$\bullet$	<code>\bullet</code>	$\backslash$	<code>\setminus</code>
$\ddagger$	<code>\ddagger</code>	$\cdot$	<code>\cdot</code>	$\wr$	<code>\wr</code>	$\amalg$	<code>\amalg</code>

# Một số ký hiệu toán học (tiếp)

## Set and/or Logic Notation

Symbol	Script	Symbol	Script
$\exists$	<code>\exists</code>	$\rightarrow$	<code>\rightarrow</code> or <code>\to</code>
$\nexists$	<code>\nexists</code>	$\leftarrow$	<code>\leftarrow</code> or <code>\gets</code>
$\forall$	<code>\forall</code>	$\mapsto$	<code>\mapsto</code>
$\neg$	<code>\neg</code>	$\implies$	<code>\implies</code>
$\subset$	<code>\subset</code>	$\Rightarrow$	<code>\Rightarrow</code> or <code>\implies</code>
$\supset$	<code>\supset</code>	$\leftrightarrow$	<code>\leftrightarrow</code>
$\in$	<code>\in</code>	$\iff$	<code>\iff</code>
$\notin$	<code>\notin</code>	$\Leftrightarrow$	<code>\Leftrightarrow</code> (preferred for equivalence (iff))
$\ni$	<code>\ni</code>	$\top$	<code>\top</code>
$\wedge$	<code>\wedge</code>	$\bot$	<code>\bot</code>
$\vee$	<code>\vee</code>	$\emptyset$ and $\varnothing$	<code>\emptyset</code> and <code>\varnothing</code>

# Một số ký hiệu toán học (tiếp)

Greek Letters

Symbol	Script	Symbol	Script
A and $\alpha$	A and <code>\alpha</code>	N and $\nu$	N and <code>\nu</code>
B and $\beta$	B and <code>\beta</code>	$\Xi$ and $\xi$	<code>\Xi</code> and <code>\xi</code>
$\Gamma$ and $\gamma$	<code>\Gamma</code> and <code>\gamma</code>	O and $\omicron$	O and <code>\omicron</code>
$\Delta$ and $\delta$	<code>\Delta</code> and <code>\delta</code>	$\Pi$ , $\pi$ and $\varpi$	<code>\Pi</code> , <code>\pi</code> and <code>\varpi</code>
E, $\epsilon$ and $\varepsilon$	E, <code>\epsilon</code> and <code>\varepsilon</code>	P, $\rho$ and $\varrho$	P, <code>\rho</code> and <code>\varrho</code>
Z and $\zeta$	Z and <code>\zeta</code>	$\Sigma$ , $\sigma$ and $\varsigma$	<code>\Sigma</code> , <code>\sigma</code> and <code>\varsigma</code>
H and $\eta$	H and <code>\eta</code>	T and $\tau$	T and <code>\tau</code>
$\Theta$ , $\theta$ and $\vartheta$	<code>\Theta</code> , <code>\theta</code> and <code>\vartheta</code>	$\Upsilon$ and $\upsilon$	<code>\Upsilon</code> and <code>\upsilon</code>
I and $\iota$	I and <code>\iota</code>	$\Phi$ , $\phi$ , and $\varphi$	<code>\Phi</code> , <code>\phi</code> and <code>\varphi</code>
K, $\kappa$ and $\varkappa$	K, <code>\kappa</code> and <code>\varkappa</code>	X and $\chi$	X and <code>\chi</code>
$\Lambda$ and $\lambda$	<code>\Lambda</code> and <code>\lambda</code>	$\Psi$ and $\psi$	<code>\Psi</code> and <code>\psi</code>
M and $\mu$	M and <code>\mu</code>	$\Omega$ and $\omega$	<code>\Omega</code> and <code>\omega</code>

# Một số ký hiệu toán học (tiếp)

Delimiters

Symbol	Script	Symbol	Script	Symbol	Script	Symbol	Script
	or \mid (difference in spacing)		\	/	/	\	\backslash
{	\{	}	\}	<	\langle	>	\rangle
↑	\uparrow	↑	\Uparrow	⌈	\lceil	⌈	\rceil
↓	\downarrow	↓	\Downarrow	⌊	\lfloor	⌋	\rfloor

Other symbols

Symbol	Script	Symbol	Script	Symbol	Script	Symbol	Script	Symbol	Script
$\partial$	\partial	$\imath$	\imath	$\Re$	\Re	$\nabla$	\nabla	$\aleph$	\aleph
$\eth$	\eth	$\jmath$	\jmath	$\Im$	\Im	$\Box$	\Box	$\beth$	\beth
$\hbar$	\hbar	$\ell$	\ell	$\wp$	\wp	$\infty$	\infty	$\gimel$	\gimel

Trigonometric Functions

Symbol	Script	Symbol	Script	Symbol	Script	Symbol	Script
sin	\sin	arcsin	\arcsin	sinh	\sinh	sec	\sec
cos	\cos	arccos	\arccos	cosh	\cosh	csc	\csc
tan	\tan	arctan	\arctan	tanh	\tanh		
cot	\cot	arccot	\arccot	coth	\coth		



# Bảng biểu

Col1	Col2	Col2	Col3
1	6	87837	787
2	7	78	5415
3	545	778	7507
4	545	18744	7560
5	88	788	6344

```
1 \begin{center}
2 \begin{tabular}{||c|c|c|c||}
3 \hline
4 Col1 & Col2 & Col2 & Col3 \\\
   & [0.5ex]
5 \hline\hline
6 1 & 6 & 87837 & 787 \\\
7 \hline
8 2 & 7 & 78 & 5415 \\\
9 \hline
10 3 & 545 & 778 & 7507 \\\
11 \hline
12 4 & 545 & 18744 & 7560 \\\
13 \hline
14 5 & 88 & 788 & 6344 \\\ [1ex]
15 \hline
16 \end{tabular}
17 \end{center}
```

## Bảng với độ rộng cột xác định sử dụng package **array**

cell1 dummy text dummy text dummy text	cell2	cell3
cell1 dummy text dummy text dummy text	cell5	cell6
cell7	cell8	cell9

```
1 \begin{center}
2 \begin{tabular}{| m{5em} |
   m{1cm}| m{1cm} | }
3 \hline
4 cell1 dummy text dummy text
   dummy text & cell2 & cell
   3 \\
5 \hline
6 cell1 dummy text dummy text
   dummy text & cell5 &
   cell6 \\
7 \hline
8 cell7 & cell8 & cell9 \\
9 \hline
10 \end{tabular}
11 \end{center}
```

# Merge dòng

Country List		
cell1 dummy text dummy text dummy text	cell2	cell3
cell1 dummy text dummy text dummy text	cell5	cell6
cell7	cell8	cell9

```
1 \begin{center}
2 \begin{tabular}{| m{5em} |
   m{1cm}| m{1cm} | }
3 \hline
4 \multicolumn{3}{|c|}{Country
   List} \\
5 \hline
6 cell1 dummy text dummy text
   dummy text & cell2 & cell
   3 \\
7 \hline
8 cell1 dummy text dummy text
   dummy text & cell5 &
   cell6 \\
9 \hline
10 cell7 & cell8 & cell9 \\
11 \hline
12 \end{tabular}
13 \end{center}
```

## Merge cột sử dụng package **multirow**

col1	col2	col3
Multiple row	cell2	cell3
	cell5	cell6
	cell8	cell9

```
1 \begin{center}
2 \begin{tabular}{|c|c|c|c| }
3 \hline
4 col1 & col2 & col3 & \\
5 \hline
6 \multirow{3}{4em}{Multiple
   row} & cell2 & cell3 & \\
7 & cell5 & cell6 & \\
8 & cell8 & cell9 & \\
9 \hline
10 \end{tabular}
11 \end{center}
```

# Xác định vị trí bảng với môi trường `table`

Các lựa chọn `h` , `t` , `b` , `!`

Col1	Col2	Col2	Col3
1	6	87837	787
2	7	78	5415
3	545	778	7507
4	545	18744	7560
5	88	788	6344

```
1 \begin{table}[h!]  
2 \centering  
3 \begin{tabular}{||c c c c||}  
4 \hline  
5 Col1 & Col2 & Col2 & Col3 \\  
      [0.5ex]  
6 \hline\hline  
7 1 & 6 & 87837 & 787 \\  
8 2 & 7 & 78 & 5415 \\  
9 3 & 545 & 778 & 7507 \\  
10 4 & 545 & 18744 & 7560 \\  
11 5 & 88 & 788 & 6344 \\\ [1ex]  
12 \hline  
13 \end{tabular}  
14 \end{table}
```

# Nhấn và tham chiếu

The table ??.

Col1	Col2	Col2
1	6	87837
2	7	78
3	545	778
4	545	18744
5	88	788

Bảng 1: Table to test captions and labels

```
1 The table \ref{table:mytab}.
2 \begin{table}[h!]
3 \centering
4 \begin{tabular}{||c c c||}
5 \hline
6 Col1 & Col2 & Col2\\ \ [0.5ex]
7 \hline\hline
8 1 & 6 & 87837 \\
9 2 & 7 & 78 \\
10 3 & 545 & 778 \\
11 4 & 545 & 18744 \\
12 5 & 88 & 788 \\ \ [1ex] \hline
13 \end{tabular}
14 \caption{Table to test
           captions and labels}
15 \label{table:mytab}
16 \end{table}
```

# Chèn hình ảnh

The universe is immense and it seems to be homogeneous, in a large scale, everywhere we look at.



There's a picture of a galaxy above

```
1 The universe is immense and  
  it seems to be  
    homogeneous,  
2 in a large scale, everywhere  
  we look at.  
3  
4 \includegraphics{universe}  
5  
6 There's a picture of a  
  galaxy above
```

# Xác định kích thước ảnh

The universe is immense and it seems to be homogeneous, in a large scale, everywhere we look at.



There's a picture of a galaxy above

1The universe is immense and  
it seems to be  
homogeneous,  
2in a large scale, everywhere  
we look at.

3  
4`\includegraphics[width=4cm,  
height=3cm]{universe}`

5  
6There's a picture of a  
galaxy above



# Thay đổi tỷ lệ và xoay ảnh

The universe is immense and it seems to be homogeneous, in a large scale, everywhere we look at.



There's a picture of a galaxy above

1 The universe is immense and  
it seems to be  
homogeneous,  
2 in a large scale, everywhere  
we look at.

3  
4 `\includegraphics[scale=0.5,  
angle=45]{universe}`

5  
6 There's a picture of a  
galaxy above

# Xác định vị trí sử dụng môi trường `figure`

The universe is immense and it seems to be homogeneous, in a large scale, everywhere we look at.



```
1 The universe is immense and  
  it seems to be  
  homogeneous,  
2 in a large scale, everywhere  
  we look at.  
3 \begin{figure}[t]  
4 \includegraphics[width=4cm]{  
  universe}  
5 \centering  
6 \end{figure}
```

# Wrap ảnh sử dụng gói wrapfig

There are several ways to plot a function of two variables, depending on the information you are interested in. For instance, if you want to see the mesh of a function so it easier to see the derivative you can use a plot like the one on the left.



```
1 \begin{wrapfigure}{r}{0.25\  
   textwidth} %this figure  
   will be at the right  
2     \centering  
3     \includegraphics[  
       width=0.25\  
       textwidth]{  
         universe}  
4 \end{wrapfigure}
```

```
5  
6 There are several ways to  
   plot a function of two  
   variables,  
7 depending on the information  
   you are interested in.  
   For  
8 instance, if you want to see  
   the mesh of a function  
   so it  
   easier to see the derivative
```

# Wrap ảnh



Hình 1: a nice plot

As you can see in the figure ??, the function grows near 0. Also, in the page ?? is the same example.

```
1 \begin{figure}[h]
2 \centering
3 \includegraphics[width=0.25\
   textwidth]{universe}
4 \caption{a nice plot}
5 \label{fig:uni1}
6 \end{figure}
7
8 As you can see in the figure
   \ref{fig:uni1}, the
9 function grows near 0. Also,
   in the page \pageref{
   fig:uni1}
10 is the same example.
```

# tableofcontents, listoftables, listoffigures

- 1 Biểu thức toán
- 2 Bảng biểu
- 3 Hình ảnh
- 4 Tham chiếu

```
1 \tableofcontents  
2 \listoftables  
3 \listoffigures
```

# Merge cột sử dụng package **multirow**

```
1          \begin{center}
2              \begin{
                tabula
                }{
                |c|
                c|c
                |c|
                }
3              \
4              co
```

# Danh sách tài liệu tham khảo trong file $\text{\LaTeX}$

```
\begin{thebibliography}{9}  
\bibitem{latexcompanion}  
Michel Goossens, Frank Mittelbach, and Alexander  
Samarin.  
\textit{The \LaTeX\ Companion}.  
Addison-Wesley, Reading, Massachusetts, 1993.  
  
\bibitem{einstein}  
Albert Einstein.  
\textit{Zur Elektrodynamik bewegter K{"o}rper}. (  
German)  
[  
\textit{On the electrodynamics of moving bodies}].  
Annalen de Physik, 322(10):891-921, 1905.  
  
\bibitem{knuthwebsite}  
Knuth: Computers and Typesetting,  
\\texttt{http://www-cs-faculty.stanford.edu/~{}uno/  
abcde.html}  
\end{thebibliography}
```

# References

- [1] Michel Goossens, Frank Mittelbach, and Alexander Samarin. *The L<sup>A</sup>T<sub>E</sub>X Companion*. Addison-Wesley, Reading, Massachusetts, 1993.
- [2] Albert Einstein. *Zur Elektrodynamik bewegter Körper*. (German) [*On the electrodynamics of moving bodies*]. *Annalen der Physik*, 322(10):891–921, 1905.
- [3] Knuth: *Computers and Typesetting*,  
<http://www-cs-faculty.stanford.edu/~uno/abcde.html>



# Tài liệu tham khảo lưu trong file ngoài

```
@article{einstein,  
  author = "Albert Einstein",  
  title = "{Zur Elektrodynamik bewegter K{\"o}rper}. ({German})  
    [{On} the electrodynamics of moving bodies]",  
  journal = "Annalen der Physik",  
  volume = "322",  
  number = "10",  
  pages = "891--921",  
  year = "1905",  
  DOI = "http://dx.doi.org/10.1002/andp  
    .19053221004"  
}
```

```
@book{latexcompanion,  
  author = "Michel Goossens and Frank Mittelbach and  
    Alexander Samarin",  
  title = "The \LaTeX\ Companion",  
  year = "1993",  
  publisher = "Addison-Wesley"
```

# Chèn danh sách tài liệu tham khảo vào L<sup>A</sup>T<sub>E</sub>X

## Sử dụng lệnh

is the same example. `\cite{einstein}`

`\bibliographystyle{plain}`

`\bibliography{d:/temp/sample}`

---

1 is the same example. [1]

## References

- [1] Albert Einstein. Zur Elektrodynamik bewegter Körper. (German) [On the electrodynamics of moving bodies]. *Annalen der Physik*, 322(10):891–921, 1905.