
Instituto Superior de Ciências de Educação da Huíla
ISCED-HUÍLA

# O Uso da Tecnologia Latex para a Elaboração das Publicações Científicas: Caso de Estudo dos Relatórios de Publicações Científicas no ISCED-HUÍLA

Luzolo L. Pedro Matumona

LUBANGO

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Trabalho apresentado para a obtenção do Grau de Licenciada no Ensino de Informática Educativa.

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LUBANGO

2021


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Luzolo L. Pedro Matumona

LUBANGO

2021

Dedicado a minha família... etc, etc e etc.

# Agradecimentos

Se for o caso agradecer à CAPES pelo apoio financeiro por meio da bolsa concedida. Lorem ipsum dolor

# Resumo

No resumo são ressaltados o objetivo da pesquisa, o método utilizado, as discussões e os resultados com destaque apenas para os pontos principais. O resumo deve ser significativo, composto de uma sequência de frases concisas, afirmativas, e não de uma enumeração de tópicos. Não deve conter citações. Deve usar o verbo na voz ativa e na terceira pessoa do singular. O texto do resumo deve ser digitado, em um único bloco, sem espaço de parágrafo. O espaçamento entre linhas é simples e o tamanho da fonte é 12. Abaixo do resumo, informar as palavras-chave (palavras ou expressões significativas retiradas do texto) ou, termos retirados de thesaurus da área. Deve conter de 150 a 500 palavras. O resumo é elaborado de acordo com a NBR 6028.

**Palavras-chave**: Palava 1. Palavra 2. Palavra 3.

# Abstract

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Mauris elementum enim a lectus feugiat, vitae efficitur nunc lobortis. Nullam gravida congue felis vel vulputate. Quisque sed scelerisque tellus, eu dignissim leo. Ut id lobortis tortor. Vestibulum non ante mauris. Phasellus nec risus elementum, sodales ex at, lobortis elit. Ut fermentum, felis non dignissim vestibulum, eros risus aliquet turpis, vel ultrices justo tortor sit amet sem. In ullamcorper tellus aliquam sapien consequat, eget gravida tortor malesuada.

Nullam non neque vitae metus gravida mattis eget ac lacus. In imperdiet consectetur felis, et auctor sem. Sed nec dolor sed lorem placerat auctor. Sed quis congue nulla. Nunc accumsan suscipit felis ac iaculis. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia curae; Donec ut erat tincidunt nibh venenatis dapibus vel in nisl.

**Keywords**: Keyword 1. Keyword 2. Keyword 3.

# Lista de ilustrações

# Lista de quadros

# Lista de tabelas

# Lista de abreviaturas e siglas

SBF: Sociedade Brasileira de Física

MNPEF: Mestrado Nacional Profissional em Ensino de Física

# Lista de símbolos

| | |
|---|---|
| $CO_2$ | Dióxido de Carbono |
| $C_{3+}$ | Hidrocarbonetos com três ou mais carbonos |

# Sumário

# 1 Capitulo 1

## 1.1 Importância da Investigação

## 1.2 Antecedentes do Tema

Escreve aqui a antecedentes do tema....

## 1.3 Justificação da Investigação

Escreve aqui a justificação da investigação...

## 1.4 Questão da Investigação

## 1.5 Objectivo Geral da Investigação

Escreve aqui os objectivos da investigação....

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## 1.6 Campo de Acção da Investigação

Escreve aqui o campo de acção da investigação...

## 1.7 Hipótese da Investigação

Escreve aqui a Hipotese da investigação...

# Metodologia da Investigação

Escreve aqui o desenho metodológico da investigação...

## 1.8 Estrutura do Trabalho

# 2 Capitulo 2

## 2.1 Contexto Histórico

# 3 Capitulo 3

Escreve aqui o conteúdo deste capitulo....

## 3.1 Visão Geral

# 4 Conclusão

Escreva aqui a sua conclusão.

# 5 Recomendações

Escreva aqui as recomendações.

# Referências

# ANEXO A – Exemplo de símbolos em latex

# LaTeX Mathematical Symbols

The more unusual symbols are not defined in base LaTeX (NFSS) and require `\usepackage{amssymb}`

## 1 Greek and Hebrew letters

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $\alpha$ | \alpha | $\kappa$ | \kappa | $\psi$ | \psi | $\digamma$ | \digamma | $\Delta$ | \Delta | $\Theta$ | \Theta |
| $\beta$ | \beta | $\lambda$ | \lambda | $\rho$ | \rho | $\varepsilon$ | \varepsilon | $\Gamma$ | \Gamma | $\Upsilon$ | \Upsilon |
| $\chi$ | \chi | $\mu$ | \mu | $\sigma$ | \sigma | $\varkappa$ | \varkappa | $\Lambda$ | \Lambda | $\Xi$ | \Xi |
| $\delta$ | \delta | $\nu$ | \nu | $\tau$ | \tau | $\varphi$ | \varphi | $\Omega$ | \Omega | | |
| $\epsilon$ | \epsilon | $o$ | o | $\theta$ | \theta | $\varpi$ | \varpi | $\Phi$ | \Phi | $\aleph$ | \aleph |
| $\eta$ | \eta | $\omega$ | \omega | $\upsilon$ | \upsilon | $\varrho$ | \varrho | $\Pi$ | \Pi | $\beth$ | \beth |
| $\gamma$ | \gamma | $\phi$ | \phi | $\xi$ | \xi | $\varsigma$ | \varsigma | $\Psi$ | \Psi | $\daleth$ | \daleth |
| $\iota$ | \iota | $\pi$ | \pi | $\zeta$ | \zeta | $\vartheta$ | \vartheta | $\Sigma$ | \Sigma | $\gimel$ | \gimel |

## 2 LaTeX math constructs

| | | | | | |
|---|---|---|---|---|---|
| $\frac{abc}{xyz}$ | \frac{abc}{xyz} | $\overline{abc}$ | \overline{abc} | $\overrightarrow{abc}$ | \overrightarrow{abc} |
| $f'$ | f' | $\underline{abc}$ | \underline{abc} | $\overleftarrow{abc}$ | \overleftarrow{abc} |
| $\sqrt{abc}$ | \sqrt{abc} | $\widehat{abc}$ | \widehat{abc} | $\overbrace{abc}$ | \overbrace{abc} |
| $\sqrt[n]{abc}$ | \sqrt[n]{abc} | $\widetilde{abc}$ | \widetilde{abc} | $\underbrace{abc}$ | \underbrace{abc} |

## 3 Delimiters

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| \| | \| | { | \{ | $\lfloor$ | \lfloor | / | / | $\Uparrow$ | \Uparrow | $\llcorner$ | \llcorner |
| \| | \vert | } | \} | $\rfloor$ | \rfloor | \ | \backslash | $\uparrow$ | \uparrow | $\lrcorner$ | \lrcorner |
| $\|\|$ | \\| | $\langle$ | \langle | $\lceil$ | \lceil | [ | [ | $\Downarrow$ | \Downarrow | $\ulcorner$ | \ulcorner |
| $\|\|$ | \Vert | $\rangle$ | \rangle | $\rceil$ | \rceil | ] | ] | $\downarrow$ | \downarrow | $\urcorner$ | \urcorner |

Use the pair `\left`$s_1$ and `\right`$s_2$ to match height of delimiters $s_1$ and $s_2$ to the height of their contents, e.g., `\left|` *expr* `\right|` `\left\{` *expr* `\right\}` `\left\Vert` *expr* `\right.`

## 4 Variable-sized symbols (displayed formulae show larger version)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $\sum$ | \sum | $\int$ | \int | $\biguplus$ | \biguplus | $\bigoplus$ | \bigoplus | $\bigvee$ | \bigvee |
| $\prod$ | \prod | $\oint$ | \oint | $\bigcap$ | \bigcap | $\bigotimes$ | \bigotimes | $\bigwedge$ | \bigwedge |
| $\coprod$ | \coprod | $\iint$ | \iint | $\bigcup$ | \bigcup | $\bigodot$ | \bigodot | $\bigsqcup$ | \bigsqcup |

## 5 Standard Function Names

Function names should appear in Roman, not Italic, e.g.,

Correct: `\tan(at-n\pi)` $\longrightarrow \tan(at - n\pi)$
Incorrect: `tan(at-n\pi)` $\longrightarrow tan(at - n\pi)$

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| arccos | \arccos | arcsin | \arcsin | arctan | \arctan | arg | \arg |
| cos | \cos | cosh | \cosh | cot | \cot | coth | \coth |
| csc | \csc | deg | \deg | det | \det | dim | \dim |
| exp | \exp | gcd | \gcd | hom | \hom | inf | \inf |
| ker | \ker | lg | \lg | lim | \lim | lim inf | \liminf |
| lim sup | \limsup | ln | \ln | log | \log | max | \max |
| min | \min | Pr | \Pr | sec | \sec | sin | \sin |
| sinh | \sinh | sup | \sup | tan | \tan | tanh | \tanh |

# 6 Binary Operation/Relation Symbols

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $*$ | \ast | $\pm$ | \pm | $\cap$ | \cap | $\lhd$ | \lhd |
| $\star$ | \star | $\mp$ | \mp | $\cup$ | \cup | $\rhd$ | \rhd |
| $\cdot$ | \cdot | $\amalg$ | \amalg | $\uplus$ | \uplus | $\triangleleft$ | \triangleleft |
| $\circ$ | \circ | $\odot$ | \odot | $\sqcap$ | \sqcap | $\triangleright$ | \triangleright |
| $\bullet$ | \bullet | $\ominus$ | \ominus | $\sqcup$ | \sqcup | $\unlhd$ | \unlhd |
| $\bigcirc$ | \bigcirc | $\oplus$ | \oplus | $\wedge$ | \wedge | $\unrhd$ | \unrhd |
| $\diamond$ | \diamond | $\oslash$ | \oslash | $\vee$ | \vee | $\bigtriangledown$ | \bigtriangledown |
| $\times$ | \times | $\otimes$ | \otimes | $\dagger$ | \dagger | $\bigtriangleup$ | \bigtriangleup |
| $\div$ | \div | $\wr$ | \wr | $\ddagger$ | \ddagger | $\setminus$ | \setminus |
| $\cdot$ | \centerdot | $\Box$ | \Box | $\barwedge$ | \barwedge | $\veebar$ | \veebar |
| $\circledast$ | \circledast | $\boxplus$ | \boxplus | $\curlywedge$ | \curlywedge | $\curlyvee$ | \curlyvee |
| $\circledcirc$ | \circledcirc | $\boxminus$ | \boxminus | $\Cap$ | \Cap | $\Cup$ | \Cup |
| $\circleddash$ | \circleddash | $\boxtimes$ | \boxtimes | $\bot$ | \bot | $\top$ | \top |
| $\dotplus$ | \dotplus | $\boxdot$ | \boxdot | $\intercal$ | \intercal | $\rightthreetimes$ | \rightthreetimes |
| $\divideontimes$ | \divideontimes | $\square$ | \square | $\doublebarwedge$ | \doublebarwedge | $\leftthreetimes$ | \leftthreetimes |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\equiv$ | \equiv | $\leq$ | \leq | $\geq$ | \geq | $\perp$ | \perp |
| $\cong$ | \cong | $\prec$ | \prec | $\succ$ | \succ | $\mid$ | \mid |
| $\neq$ | \neq | $\preceq$ | \preceq | $\succeq$ | \succeq | $\parallel$ | \parallel |
| $\sim$ | \sim | $\ll$ | \ll | $\gg$ | \gg | $\bowtie$ | \bowtie |
| $\simeq$ | \simeq | $\subset$ | \subset | $\supset$ | \supset | $\Join$ | \Join |
| $\approx$ | \approx | $\subseteq$ | \subseteq | $\supseteq$ | \supseteq | $\ltimes$ | \ltimes |
| $\asymp$ | \asymp | $\sqsubset$ | \sqsubset | $\sqsupset$ | \sqsupset | $\rtimes$ | \rtimes |
| $\doteq$ | \doteq | $\sqsubseteq$ | \sqsubseteq | $\sqsupseteq$ | \sqsupseteq | $\smile$ | \smile |
| $\propto$ | \propto | $\dashv$ | \dashv | $\vdash$ | \vdash | $\frown$ | \frown |
| $\models$ | \models | $\in$ | \in | $\ni$ | \ni | $\notin$ | \notin |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\approxeq$ | \approxeq | $\leqq$ | \leqq | $\geqq$ | \geqq | $\lessgtr$ | \lessgtr |
| $\thicksim$ | \thicksim | $\leqslant$ | \leqslant | $\geqslant$ | \geqslant | $\lesseqgtr$ | \lesseqgtr |
| $\backsim$ | \backsim | $\lessapprox$ | \lessapprox | $\gtrapprox$ | \gtrapprox | $\lesseqqgtr$ | \lesseqqgtr |
| $\backsimeq$ | \backsimeq | $\lll$ | \lll | $\ggg$ | \ggg | $\gtreqqless$ | \gtreqqless |
| $\triangleq$ | \triangleq | $\lessdot$ | \lessdot | $\gtrdot$ | \gtrdot | $\gtreqless$ | \gtreqless |
| $\circeq$ | \circeq | $\lesssim$ | \lesssim | $\gtrsim$ | \gtrsim | $\gtrless$ | \gtrless |
| $\bumpeq$ | \bumpeq | $\eqslantless$ | \eqslantless | $\eqslantgtr$ | \eqslantgtr | $\backepsilon$ | \backepsilon |
| $\Bumpeq$ | \Bumpeq | $\precsim$ | \precsim | $\succsim$ | \succsim | $\between$ | \between |
| $\doteqdot$ | \doteqdot | $\precapprox$ | \precapprox | $\succapprox$ | \succapprox | $\pitchfork$ | \pitchfork |
| $\thickapprox$ | \thickapprox | $\Subset$ | \Subset | $\Supset$ | \Supset | $\shortmid$ | \shortmid |
| $\fallingdotseq$ | \fallingdotseq | $\subseteqq$ | \subseteqq | $\supseteqq$ | \supseteqq | $\smallfrown$ | \smallfrown |
| $\risingdotseq$ | \risingdotseq | $\sqsubset$ | \sqsubset | $\sqsupset$ | \sqsupset | $\smallsmile$ | \smallsmile |
| $\varpropto$ | \varpropto | $\preccurlyeq$ | \preccurlyeq | $\succcurlyeq$ | \succcurlyeq | $\Vdash$ | \Vdash |
| $\therefore$ | \therefore | $\curlyeqprec$ | \curlyeqprec | $\curlyeqsucc$ | \curlyeqsucc | $\vDash$ | \vDash |
| $\because$ | \because | $\blacktriangleleft$ | \blacktriangleleft | $\blacktriangleright$ | \blacktriangleright | $\Vvdash$ | \Vvdash |
| $\eqcirc$ | \eqcirc | $\trianglelefteq$ | \trianglelefteq | $\trianglerighteq$ | \trianglerighteq | $\shortparallel$ | \shortparallel |
| $\neq$ | \neq | $\vartriangleleft$ | \vartriangleleft | $\vartriangleright$ | \vartriangleright | $\nshortparallel$ | \nshortparallel |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\ncong$ | \ncong | $\nleq$ | \nleq | $\ngeq$ | \ngeq | $\nsubseteq$ | \nsubseteq |
| $\nmid$ | \nmid | $\nleqq$ | \nleqq | $\ngeqq$ | \ngeqq | $\nsupseteq$ | \nsupseteq |
| $\nparallel$ | \nparallel | $\nleqslant$ | \nleqslant | $\ngeqslant$ | \ngeqslant | $\nsubseteqq$ | \nsubseteqq |
| $\nshortmid$ | \nshortmid | $\nless$ | \nless | $\ngtr$ | \ngtr | $\nsupseteqq$ | \nsupseteqq |
| $\nshortparallel$ | \nshortparallel | $\nprec$ | \nprec | $\nsucc$ | \nsucc | $\subsetneq$ | \subsetneq |
| $\nsim$ | \nsim | $\npreceq$ | \npreceq | $\nsucceq$ | \nsucceq | $\supsetneq$ | \supsetneq |
| $\nVDash$ | \nVDash | $\precnapprox$ | \precnapprox | $\succnapprox$ | \succnapprox | $\subsetneqq$ | \subsetneqq |
| $\nvDash$ | \nvDash | $\precnsim$ | \precnsim | $\succnsim$ | \succnsim | $\supsetneqq$ | \supsetneqq |
| $\nvdash$ | \nvdash | $\lnapprox$ | \lnapprox | $\gnapprox$ | \gnapprox | $\varsubsetneq$ | \varsubsetneq |
| $\ntriangleleft$ | \ntriangleleft | $\lneq$ | \lneq | $\gneq$ | \gneq | $\varsupsetneq$ | \varsupsetneq |
| $\ntrianglelefteq$ | \ntrianglelefteq | $\lneqq$ | \lneqq | $\gneqq$ | \gneqq | $\varsubsetneqq$ | \varsubsetneqq |
| $\ntriangleright$ | \ntriangleright | $\lnsim$ | \lnsim | $\gnsim$ | \gnsim | $\varsupsetneqq$ | \varsupsetneqq |
| $\ntrianglerighteq$ | \ntrianglerighteq | $\lvertneqq$ | \lvertneqq | $\gvertneqq$ | \gvertneqq | | |

# 7 Arrow symbols

| | | | | | |
|---|---|---|---|---|---|
| $\leftarrow$ | \leftarrow | $\longleftarrow$ | \longleftarrow | $\uparrow$ | \uparrow |
| $\Leftarrow$ | \Leftarrow | $\Longleftarrow$ | \Longleftarrow | $\Uparrow$ | \Uparrow |
| $\rightarrow$ | \rightarrow | $\longrightarrow$ | \longrightarrow | $\downarrow$ | \downarrow |
| $\Rightarrow$ | \Rightarrow | $\Longrightarrow$ | \Longrightarrow | $\Downarrow$ | \Downarrow |
| $\leftrightarrow$ | \leftrightarrow | $\longleftrightarrow$ | \longleftrightarrow | $\updownarrow$ | \updownarrow |
| $\Leftrightarrow$ | \Leftrightarrow | $\Longleftrightarrow$ | \Longleftrightarrow | $\Updownarrow$ | \Updownarrow |
| $\mapsto$ | \mapsto | $\longmapsto$ | \longmapsto | $\nearrow$ | \nearrow |
| $\hookleftarrow$ | \hookleftarrow | $\hookrightarrow$ | \hookrightarrow | $\searrow$ | \searrow |
| $\leftharpoonup$ | \leftharpoonup | $\rightharpoonup$ | \rightharpoonup | $\swarrow$ | \swarrow |
| $\leftharpoondown$ | \leftharpoondown | $\rightharpoondown$ | \rightharpoondown | $\nwarrow$ | \nwarrow |
| $\rightleftharpoons$ | \rightleftharpoons | $\leadsto$ | \leadsto | | |
| $\dashrightarrow$ | \dashrightarrow | $\dashleftarrow$ | \dashleftarrow | $\leftleftarrows$ | \leftleftarrows |
| $\leftrightarrows$ | \leftrightarrows | $\Lleftarrow$ | \Lleftarrow | $\twoheadleftarrow$ | \twoheadleftarrow |
| $\leftarrowtail$ | \leftarrowtail | $\looparrowleft$ | \looparrowleft | $\leftrightharpoons$ | \leftrightharpoons |
| $\curvearrowleft$ | \curvearrowleft | $\circlearrowleft$ | \circlearrowleft | $\Lsh$ | \Lsh |
| $\upuparrows$ | \upuparrows | $\upharpoonleft$ | \upharpoonleft | $\downharpoonleft$ | \downharpoonleft |
| $\multimap$ | \multimap | $\leftrightsquigarrow$ | \leftrightsquigarrow | $\rightrightarrows$ | \rightrightarrows |
| $\rightleftarrows$ | \rightleftarrows | $\rightrightarrows$ | \rightrightarrows | $\rightleftarrows$ | \rightleftarrows |
| $\twoheadrightarrow$ | \twoheadrightarrow | $\rightarrowtail$ | \rightarrowtail | $\looparrowright$ | \looparrowright |
| $\rightleftharpoons$ | \rightleftharpoons | $\curvearrowright$ | \curvearrowright | $\circlearrowright$ | \circlearrowright |
| $\Rsh$ | \Rsh | $\downdownarrows$ | \downdownarrows | $\upharpoonright$ | \upharpoonright |
| $\downharpoonright$ | \downharpoonright | $\rightsquigarrow$ | \rightsquigarrow | | |
| $\nleftarrow$ | \nleftarrow | $\nrightarrow$ | \nrightarrow | $\nLeftarrow$ | \nLeftarrow |
| $\nRightarrow$ | \nRightarrow | $\nleftrightarrow$ | \nleftrightarrow | $\nLeftrightarrow$ | \nLeftrightarrow |

# 8 Miscellaneous symbols

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\infty$ | \infty | $\forall$ | \forall | $\Bbbk$ | \Bbbk | $\wp$ | \wp |
| $\nabla$ | \nabla | $\exists$ | \exists | $\bigstar$ | \bigstar | $\angle$ | \angle |
| $\partial$ | \partial | $\nexists$ | \nexists | $\diagdown$ | \diagdown | $\measuredangle$ | \measuredangle |
| $\eth$ | \eth | $\emptyset$ | \emptyset | $\diagup$ | \diagup | $\sphericalangle$ | \sphericalangle |
| $\clubsuit$ | \clubsuit | $\varnothing$ | \varnothing | $\Diamond$ | \Diamond | $\complement$ | \complement |
| $\diamondsuit$ | \diamondsuit | $\imath$ | \imath | $\Finv$ | \Finv | $\triangledown$ | \triangledown |
| $\heartsuit$ | \heartsuit | $\jmath$ | \jmath | $\Game$ | \Game | $\triangle$ | \triangle |
| $\spadesuit$ | \spadesuit | $\ell$ | \ell | $\hbar$ | \hbar | $\vartriangle$ | \vartriangle |
| $\cdots$ | \cdots | $\iiiint$ | \iiiint | $\hslash$ | \hslash | $\blacklozenge$ | \blacklozenge |
| $\vdots$ | \vdots | $\iiint$ | \iiint | $\lozenge$ | \lozenge | $\blacksquare$ | \blacksquare |
| $\ldots$ | \ldots | $\iint$ | \iint | $\mho$ | \mho | $\blacktriangle$ | \blacktriangle |
| $\ddots$ | \ddots | $\sharp$ | \sharp | $\prime$ | \prime | $\blacktriangledown$ | \blacktrinagledown |
| $\Im$ | \Im | $\flat$ | \flat | $\square$ | \square | $\backprime$ | \backprime |
| $\Re$ | \Re | $\natural$ | \natural | $\surd$ | \surd | $\circledS$ | \circledS |

# 9 Math mode accents

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\acute{a}$ | \acute{a} | $\bar{a}$ | \bar{a} | $\acute{A}$ | \Acute{\Acute{A}} | $\bar{\bar{A}}$ | \Bar{\Bar{A}} |
| $\breve{a}$ | \breve{a} | $\check{a}$ | \check{a} | $\breve{A}$ | \Breve{\Breve{A}} | $\check{A}$ | \Check{\Check{A}} |
| $\ddot{a}$ | \ddot{a} | $\dot{a}$ | \dot{a} | $\ddot{A}$ | \Ddot{\Ddot{A}} | $\dot{A}$ | \Dot{\Dot{A}} |
| $\grave{a}$ | \grave{a} | $\hat{a}$ | \hat{a} | $\grave{A}$ | \Grave{\Grave{A}} | $\hat{A}$ | \Hat{\Hat{A}} |
| $\tilde{a}$ | \tilde{a} | $\vec{a}$ | \vec{a} | $\tilde{A}$ | \Tilde{\Tilde{A}} | $\vec{A}$ | \Vec{\Vec{A}} |

## 10 Array environment, examples

Simplest version: `\begin{array}{`*cols*`}` $row_1$ `\\` $row_2$ `\\` $\ldots$ $row_m$ `\end{array}`
where *cols* includes one character [`lrc`] for each column (with optional characters `|` inserted for vertical lines) and $row_j$ includes character `&` a total of $(n-1)$ times to separate the $n$ elements in the row. Examples:

```
\left( \begin{array}{cc} 2\tau & 7\phi-frac5{12} \\
          3\psi & \frac{\pi}8 \end{array} \right)
\left( \begin{array}{c} x \\ y \end{array} \right)
\mbox{~and~} \left[ \begin{array}{cc|r}
     3 & 4 & 5 \\ 1 & 3 & 729 \end{array} \right]
```

$$\left( \begin{array}{cc} 2\tau & 7\phi-\frac{5}{12} \\ 3\psi & \frac{\pi}{8} \end{array} \right) \left( \begin{array}{c} x \\ y \end{array} \right) \text{ and } \left[ \begin{array}{cc|r} 3 & 4 & 5 \\ 1 & 3 & 729 \end{array} \right]$$

```
f(z) =     \left\{ \begin{array}{rcl}
       \overline{\overline{z^2}+\cos z} & \mbox{for}
       & |z|<3 \\ 0  & \mbox{for} & 3\leq|z|\leq5 \\
       \sin\overline{z} & \mbox{for} & |z|>5
             \end{array}\right.
```

$$f(z) = \left\{ \begin{array}{rcl} \overline{\overline{z^2}+\cos z} & \text{for} & |z|<3 \\ 0 & \text{for} & 3\leq|z|\leq5 \\ \sin\overline{z} & \text{for} & |z|>5 \end{array}\right.$$

## 11 Other Styles (math mode only)

**Caligraphic letters**: `$\mathcal{A}$` etc.: $\mathcal{ABCDEFGHIJKLMNOPQRSTUVWXYZ}$

**Mathbb letters**: `$\mathbb{A}$` etc.: $\mathbb{ABCDEFGHIJKLMNOPQRSTUVWXYZ}$

**Mathfrak letters**: `$\mathfrak{A}$` etc.: $\mathfrak{ABCDEFGHIJKLMNOPQRSTUVWXYZabc123}$

**Math Sans serif letters**: `$\mathsf{A}$` etc.: $\mathsf{ABCDEFGHIJKLMNOPQRSTUVWXYZabc123}$

**Math bold letters**: `$\mathbf{A}$` etc.: $\mathbf{ABCDEFGHIJKLMNOPQRSTUVWXYZabc123}$

**Math bold italic letters**: define `\def\mathbi#1{\textbf{\em #1}}` then use `$\mathbi{A}$` etc.:
$\boldsymbol{ABCDEFGHIJKLMNOPQRSTUVWXYZ\ abc\ \ 123}$

## 12 Font sizes

**Math Mode:**

$$\int f^{-1}(x-x_a)\,dx \qquad \texttt{\${\displaystyle \int f\^{}\{-1\}(x-x\_a)\textbackslash,dx\}\$}$$

$$\textstyle \int f^{-1}(x-x_a)\,dx \qquad \texttt{\${\textstyle \int f\^{}\{-1\}(x-x\_a)\textbackslash,dx\}\$}$$

$$\scriptstyle \int f^{-1}(x-x_a)\,dx \qquad \texttt{\${\scriptstyle \int f\^{}\{-1\}(x-x\_a)\textbackslash,dx\}\$}$$

$$\scriptscriptstyle \int f^{-1}(x-x_a)\,dx \qquad \texttt{\${\scriptscriptstyle \int f\^{}\{-1\}(x-x\_a)\textbackslash,dx\}\$}$$

**Text Mode:**

`\tiny` = tiny
`\scriptsize` = scriptsize
`\footnotesize` = footnotesize
`\small` = small
`\normalsize` = normal
`\large` = large
`\Large` = Large
`\LARGE` = LARGE
`\huge` = huge
`\Huge` = Huge

## 13 Text Mode: Accents and Symbols

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ó | `\'{o}` | ö | `\"{o}` | ô | `\^{o}` | ò | `\`{o}` | õ | `\~{o}` | ō | `\={o}` | ș | `\d s` |
| ȯ | `\.{o}` | ŏ | `\u{o}` | ő | `\H{o}` | o͡o | `\t{oo}` | ǫ | `\c{o}` | ọ | `\d{o}` | s̊ | `\r s` |
| o̲ | `\b{o}` | Å | `\AA` | å | `\aa` | ß | `\ss` | ı | `\i` | ȷ | `\j` | s̋ | `\H s` |
| ø | `\o` | s͡ | `\t s` | š | `\v s` | Ø | `\O` | ¶ | `\P` | § | `\S` | | |
| æ | `\ae` | Æ | `\AE` | † | `\dag` | ‡ | `\ddag` | © | `\copyright` | £ | `\pounds` | | |

Apêndices

# APÊNDICE A – Referências rápidas em LaTeX

# LaTeX 2ε Cheat Sheet

## Document classes

`book` Default is two-sided.
`report` No `\part` divisions.
`article` No `\part` or `\chapter` divisions.
`letter` Letter (?).
`slides` Large sans-serif font.

Used at the very beginning of a document: `\documentclass{`*class*`}`. Use `\begin{document}` to start contents and `\end{document}` to end the document.

### Common `documentclass` options

`10pt/11pt/12pt` Font size.
`letterpaper/a4paper` Paper size.
`twocolumn` Use two columns.
`twoside` Set margins for two-sided.
`landscape` Landscape orientation. Must use `dvips -t landscape`.
`draft` Double-space lines.

Usage: `\documentclass[`*opt,opt*`]{`*class*`}`.

### Packages

`fullpage` Use 1 inch margins.
`anysize` Set margins: `\marginsize{`*l*`}{`*r*`}{`*t*`}{`*b*`}`.
`multicol` Use *n* columns: `\begin{multicols}{`*n*`}`.
`latexsym` Use LaTeX symbol font.
`graphicx` Show image: `\includegraphics[width=`*x*`]{`*file*`}`.
`url` Insert URL: `\url{`*http://...*`}`.

Use before `\begin{document}`. Usage: `\usepackage{`*package*`}`

### Title

`\author{`*text*`}` Author of document.
`\title{`*text*`}` Title of document.
`\date{`*text*`}` Date.

These commands go before `\begin{document}`. The declaration `\maketitle` goes at the top of the document.

### Miscellaneous

`\pagestyle{empty}` Empty header, footer and no page numbers.
`\tableofcontents` Add a table of contents here.

## Document structure

`\part{`*title*`}`
`\chapter{`*title*`}`
`\section{`*title*`}`
`\subsection{`*title*`}`
`\subsubsection{`*title*`}`
`\paragraph{`*title*`}`
`\subparagraph{`*title*`}`

Use `\setcounter{secnumdepth}{`*x*`}` suppresses heading numbers of depth $> x$, where `chapter` has depth 0. Use a `*`, as in `\section*{`*title*`}`, to not number a particular item—these items will also not appear in the table of contents.

### Text environments

`\begin{comment}` Comment (not printed). Requires `verbatim` package.
`\begin{quote}` Indented quotation block.
`\begin{quotation}` Like `quote` with indented paragraphs.
`\begin{verse}` Quotation block for verse.

### Lists

`\begin{enumerate}` Numbered list.
`\begin{itemize}` Bulleted list.
`\begin{description}` Description list.
`\item` *text* Add an item.
`\item[`*x*`]` *text* Use *x* instead of normal bullet or number. Required for descriptions.

### References

`\label{`*marker*`}` Set a marker for cross-reference, often of the form `\label{sec:item}`.
`\ref{`*marker*`}` Give section/body number of marker.
`\pageref{`*marker*`}` Give page number of marker.
`\footnote{`*text*`}` Print footnote at bottom of page.

### Floating bodies

`\begin{table}[`*place*`]` Add numbered table.
`\begin{figure}[`*place*`]` Add numbered figure.
`\begin{equation}[`*place*`]` Add numbered equation.
`\caption{`*text*`}` Caption for the body.

The *place* is a list valid placements for the body. `t`=top, `h`=here, `b`=bottom, `p`=separate page, `!`=place even if ugly. Captions and label markers should be within the environment.

## Text properties

### Font face

| *Command* | *Declaration* | *Effect* |
|---|---|---|
| `\textrm{`*text*`}` | `{\rmfamily` *text*`}` | Roman family |
| `\textsf{`*text*`}` | `{\sffamily` *text*`}` | Sans serif family |
| `\texttt{`*text*`}` | `{\ttfamily` *text*`}` | `Typewriter family` |
| `\textmd{`*text*`}` | `{\mdseries` *text*`}` | Medium series |
| `\textbf{`*text*`}` | `{\bfseries` *text*`}` | **Bold series** |
| `\textup{`*text*`}` | `{\upshape` *text*`}` | Upright shape |
| `\textit{`*text*`}` | `{\itshape` *text*`}` | *Italic shape* |
| `\textsl{`*text*`}` | `{\slshape` *text*`}` | *Slanted shape* |
| `\textsc{`*text*`}` | `{\scshape` *text*`}` | Small Caps shape |
| `\emph{`*text*`}` | `{\em` *text*`}` | *Emphasized* |
| `\textnormal{`*text*`}` | `{\normalfont` *text*`}` | Document font |
| `\underline{`*text*`}` | | Underline |

The command (*ttt*) form handles spacing better than the declaration (*ttt*) form.

### Font size

`\tiny` tiny
`\scriptsize` scriptsize
`\footnotesize` footnotesize
`\small` small
`\normalsize` normalsize
`\large` large
`\Large` Large
`\LARGE` LARGE
`\huge` huge
`\Huge` Huge

These are declarations and should be used in the form `{\small ...}`, or without braces to affect the entire document.

### Verbatim text

`\begin{verbatim}` Verbatim environment.
`\begin{verbatim*}` Spaces are shown as ␣.
`\verb!text!` Text between the delimiting characters (in this case '`!`') is verbatim.

### Justification

| *Environment* | *Declaration* |
|---|---|
| `\begin{center}` | `\centering` |
| `\begin{flushleft}` | `\raggedright` |
| `\begin{flushright}` | `\raggedleft` |

### Miscellaneous

`\linespread{`*x*`}` changes the line spacing by the multiplier *x*.

## Text-mode symbols

### Symbols

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| & | `\&` | _ | `\_` | ... | `\ldots` | • | `\textbullet` |
| $ | `\$` | ^ | `\^{}` | \| | `\textbar` | \ | `\textbackslash` |
| % | `\%` | ~ | `\~{}` | # | `\#` | § | `\S` |

### Accents

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ò | `\‘o` | ó | `\’o` | ô | `\^o` | ō | `\~o` | ō | `\=o` |
| ȯ | `\.o` | ö | `\"o` | o͡o | `\c o` | o̲ | `\v o` | ő | `\H o` |
| ç | `\c c` | o̩ | `\d o` | o̲ | `\b o` | o͡o | `\t oo` | œ | `\oe` |
| Œ | `\OE` | æ | `\ae` | Æ | `\AE` | å | `\aa` | Å | `\AA` |
| ø | `\o` | Ø | `\O` | ł | `\l` | Ł | `\L` | ı | `\i` |
| ȷ | `\j` | ¡ | `~‘` | ¿ | `?‘` | | | | |

### Delimiters

| | | | | | |
|---|---|---|---|---|---|
| ‘ | ‘ | { | \{ | < | `\textless` |
| ’ | ’ | } | \} | > | `\textgreater` |
| “ | ‘‘ | [ | [ | | |
| ” | ’’ | ] | ] | | |
| | | ( | ( | | |
| | | ) | ) | | |

### Dashes

| *Name* | *Source* | *Example* | *Usage* |
|---|---|---|---|
| hyphen | - | X-ray | In words. |
| en-dash | -- | 1–5 | Between numbers. |
| em-dash | --- | Yes—or no? | Punctuation. |

### Line and page breaks

`\\` Begin new line without new paragraph.
`\\*` Prohibit pagebreak after linebreak.
`\kill` Don't print current line.
`\pagebreak` Start new page.
`\noindent` Do not indent current line.

### Miscellaneous

`\today` March 28, 2017.
`$\sim$` Prints ∼ instead of `\~{}`, which makes ˜.
`~` Space, disallow linebreak (`W.J.~Clinton`).
`\@.` Indicate that the `.` ends a sentence when following an uppercase letter.
`\hspace{`*l*`}` Horizontal space of length *l* (Ex: *l* = `20pt`).
`\vspace{`*l*`}` Vertical space of length *l*.
`\rule{`*w*`}{`*h*`}` Line of width *w* and height *h*.

## Tabular environments

### `tabbing` environment

`\=` Set tab stop. `\>` Go to tab stop.

Tab stops can be set on "invisible" lines with `\kill` at the end of the line. Normally `\\` is used to separate lines.

### tabular environment

```
\begin{array}[pos]{cols}
\begin{tabular}[pos]{cols}
\begin{tabular*}{width}[pos]{cols}
```

### tabular column specification

| | |
|---|---|
| `l` | Left-justified column. |
| `c` | Centered column. |
| `r` | Right-justified column. |
| `p{`*width*`}` | Same as `\parbox[t]{`*width*`}`. |
| `@{`*decl*`}` | Insert *decl* instead of inter-column space. |
| `\|` | Inserts a vertical line between columns. |

### tabular elements

| | |
|---|---|
| `\hline` | Horizontal line between rows. |
| `\cline{`*x*`-`*y*`}` | Horizontal line across columns *x* through *y*. |
| `\multicolumn{`*n*`}{`*cols*`}{`*text*`}` | A cell that spans *n* columns, with *cols* column specification. |

## Math mode

For inline math, use `\(...\)` or `$...$`. For displayed math, use `\[...\]` or `\begin{equation}`.

| | | | |
|---|---|---|---|
| Superscript $x^x$ | `^{x}` | Subscript $x_x$ | `_{x}` |
| $\frac{x}{y}$ | `\frac{x}{y}` | $\sum_{k=1}^{n}$ | `\sum_{k=1}^n` |
| $\sqrt[n]{x}$ | `\sqrt[n]{x}` | $\prod_{k=1}^{n}$ | `\prod_{k=1}^n` |

### Math-mode symbols

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\leq$ | `\leq` | $\geq$ | `\geq` | $\neq$ | `\neq` | $\approx$ | `\approx` |
| $\times$ | `\times` | $\div$ | `\div` | $\pm$ | `\pm` | $\cdot$ | `\cdot` |
| $\circ$ | `^{\circ}` | $\circ$ | `\circ` | $\prime$ | `\prime` | $\cdots$ | `\cdots` |
| $\infty$ | `\infty` | $\neg$ | `\neg` | $\wedge$ | `\wedge` | $\vee$ | `\vee` |
| $\supset$ | `\supset` | $\forall$ | `\forall` | $\in$ | `\in` | $\rightarrow$ | `\rightarrow` |
| $\subset$ | `\subset` | $\exists$ | `\exists` | $\notin$ | `\notin` | $\Rightarrow$ | `\Rightarrow` |
| $\cup$ | `\cup` | $\cap$ | `\cap` | $\mid$ | `\mid` | $\Leftrightarrow$ | `\Leftrightarrow` |
| $\dot{a}$ | `\dot a` | $\hat{a}$ | `\hat a` | $\bar{a}$ | `\bar a` | $\tilde{a}$ | `\tilde a` |
| $\alpha$ | `\alpha` | $\beta$ | `\beta` | $\gamma$ | `\gamma` | $\delta$ | `\delta` |
| $\epsilon$ | `\epsilon` | $\zeta$ | `\zeta` | $\eta$ | `\eta` | $\varepsilon$ | `\varepsilon` |
| $\theta$ | `\theta` | $\iota$ | `\iota` | $\kappa$ | `\kappa` | $\vartheta$ | `\vartheta` |
| $\lambda$ | `\lambda` | $\mu$ | `\mu` | $\nu$ | `\nu` | $\xi$ | `\xi` |
| $\pi$ | `\pi` | $\rho$ | `\rho` | $\sigma$ | `\sigma` | $\tau$ | `\tau` |
| $\upsilon$ | `\upsilon` | $\phi$ | `\phi` | $\chi$ | `\chi` | $\psi$ | `\psi` |
| $\omega$ | `\omega` | $\Gamma$ | `\Gamma` | $\Delta$ | `\Delta` | $\Theta$ | `\Theta` |
| $\Lambda$ | `\Lambda` | $\Xi$ | `\Xi` | $\Pi$ | `\Pi` | $\Sigma$ | `\Sigma` |
| $\Upsilon$ | `\Upsilon` | $\Phi$ | `\Phi` | $\Psi$ | `\Psi` | $\Omega$ | `\Omega` |

## Bibliography and citations

When using BibTeX, you need to run `latex`, `bibtex`, and `latex` twice more to resolve dependencies.

### Citation types

| | |
|---|---|
| `\cite{`*key*`}` | Full author list and year. (Watson and Crick 1953) |
| `\citeA{`*key*`}` | Full author list. (Watson and Crick) |
| `\citeN{`*key*`}` | Full author list and year. Watson and Crick (1953) |
| `\shortcite{`*key*`}` | Abbreviated author list and year. ? |
| `\shortciteA{`*key*`}` | Abbreviated author list. ? |
| `\shortciteN{`*key*`}` | Abbreviated author list and year. ? |
| `\citeyear{`*key*`}` | Cite year only. (1953) |

All the above have an `NP` variant without parentheses; Ex. `\citeNP`.

### BibTeX entry types

| | |
|---|---|
| `@article` | Journal or magazine article. |
| `@book` | Book with publisher. |
| `@booklet` | Book without publisher. |
| `@conference` | Article in conference proceedings. |
| `@inbook` | A part of a book and/or range of pages. |
| `@incollection` | A part of book with its own title. |
| `@misc` | If nothing else fits. |
| `@phdthesis` | PhD. thesis. |
| `@proceedings` | Proceedings of a conference. |
| `@techreport` | Tech report, usually numbered in series. |
| `@unpublished` | Unpublished. |

### BibTeX fields

| | |
|---|---|
| `address` | Address of publisher. Not necessary for major publishers. |
| `author` | Names of authors, of format .... |
| `booktitle` | Title of book when part of it is cited. |
| `chapter` | Chapter or section number. |
| `edition` | Edition of a book. |
| `editor` | Names of editors. |
| `institution` | Sponsoring institution of tech. report. |
| `journal` | Journal name. |
| `key` | Used for cross ref. when no author. |
| `month` | Month published. Use 3-letter abbreviation. |
| `note` | Any additional information. |
| `number` | Number of journal or magazine. |
| `organization` | Organization that sponsors a conference. |
| `pages` | Page range (`2,6,9--12`). |
| `publisher` | Publisher's name. |
| `school` | Name of school (for thesis). |
| `series` | Name of series of books. |
| `title` | Title of work. |
| `type` | Type of tech. report, ex. "Research Note". |
| `volume` | Volume of a journal or book. |
| `year` | Year of publication. |

Not all fields need to be filled. See example below.

### Common BibTeX style files

| | | | |
|---|---|---|---|
| `abbrv` | Standard | `abstract` | `alpha` with abstract |
| `alpha` | Standard | `apa` | APA |
| `plain` | Standard | `unsrt` | Unsorted |

The LaTeX document should have the following two lines just before `\end{document}`, where `bibfile.bib` is the name of the BibTeX file.

```
\bibliographystyle{plain}
\bibliography{bibfile}
```

### BibTeX example

The BibTeX database goes in a file called *file*`.bib`, which is processed with `bibtex file`.

```
@String{N = {Na\-ture}}
@Article{WC:1953,
  author  = {James Watson and Francis Crick},
  title   = {A structure for Deoxyribose Nucleic Acid},
  journal = N,
  volume  = {171},
  pages   = {737},
  year    = 1953
}
```

## Sample LaTeX document

```
\documentclass[11pt]{article}
\usepackage{fullpage}
\title{Template}
\author{Name}
\begin{document}
\maketitle

\section{section}
\subsection*{subsection without number}
text \textbf{bold text} text. Some math: $2+2=5$
\subsection{subsection}
text \emph{emphasized text} text. \cite{WC:1953}
discovered the structure of DNA.

A table:
\begin{table}[!th]
\begin{tabular}{|l|c|r|}
\hline
first  &  row  &  data \\
second &  row  &  data \\
\hline
\end{tabular}
\caption{This is the caption}
\label{ex:table}
\end{table}

The table is numbered \ref{ex:table}.
\end{document}
```