附录——latex 语法

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LaTeX 语法

1. 什么是 LaTeX?

LaTeX is a high-quality typesetting system; it includes features designed for the production of technical and scientific documentation. LaTeX is the de facto standard for the communication and publication of scientific documents. https://www.latex-project.org

markdown 支持 LaTeX 的语法格式,在 jupyter 的 markdown 模式下,通过输入 LaTeX 语法,来实现数学公式。

2. 如何在 jupyter 下输入 latex 公式?

在 jupyter 选择 markdown 模式下,	想要在文字中混排数学符号 α 可以输入以下:
一对美元符号 \$ Latex	□ \$ _°
如果想要单独一行输入	$rac{lpha}{eta}$
可以输入:	

\$\$

\frac{\alpha}{\beta}

\$\$

3. LaTeX 符号表

下面为 LaTeX 的公式符号表:

1. 希腊 (Greek) 和希伯来语 (Hebrew) 字母对照

- 2. Latex 数学公式构造方法
- 3. 分隔符
- 4. 可变大小的符号
- 5. 标准函数名称
- 6. 二元运算
- 7. 箭头符号
- 8. 杂项符号 (miscellaneous symbols)
- 9. 数学发音
- 10. 数组缓解
- 11. 字体大小
- 12. 其他符号
- 13. 文字发音

IATEX Mathematical Symbols The more unusual symbols are not defined in base IATEX (NFSS) and require \usepackage{amssymb}

1	Crook	and	Hebrew	lottore
	CTreek	and	пергем	ietters

α	\alpha	κ	\kappa	ψ	\psi	F	\digamma	Δ	\Delta	Θ	\Theta
β	\beta	λ	\lambda	ρ	\rho	ε	\varepsilon	Γ	\Gamma	Υ	\Upsilon
χ	\chi	μ	\mu	σ	\sigma	\varkappa	\varkappa	Λ	\Lambda	Ξ	\Xi
δ	\delta	ν	\nu	au	\tau	φ	\varphi	Ω	\Omega		
ϵ	\epsilon	o	0	θ	\theta	$\overline{\omega}$	\varpi	Φ	\Phi	×	\aleph
η	\eta	ω	\omega	v	\upsilon	ϱ	\varrho	П	\Pi	コ	\beth
γ	\gamma	ϕ	\phi	ξ	\xi	ς	\varsigma	Ψ	\Psi	٦	\daleth
i	\iota	π	\pi	ζ	\zeta	ϑ	\vartheta	Σ	\Sigma	J	\gimel

LATEX math constructs

$\frac{abc}{xyz}$	$\frac{abc}{xyz}$	\overline{abc}	$\operatorname{\mathtt{oldsymbol{a}bc}}$	\overrightarrow{abc}	$\verb \overrightarrow{ } abc $
f'	f'	\underline{abc}	\underline{abc}	\overleftarrow{abc}	$\verb \overleftarrow \{abc\}$
\sqrt{abc}	\sqrt{abc}	\widehat{abc}	\widehat{abc}	\widehat{abc}	$\operatorname{\mathtt{Noverbrace}}\{\operatorname{abc}\}$
$\sqrt[n]{abc}$	$\sqrt[n]{abc}$	\widetilde{abc}	$\verb \widetilde \{abc\}$	\underbrace{abc}	$\verb \underbrace \{abc\} $

3 **Delimiters**

	{ \{	\lfloor	/ /	↑ \Uparrow	∟	\llcorner
\vert	} \}	\rfloor	\ \backslash	↑ \uparrow	٦	\lrcorner
\I	\langle \langle	\lceil	[[↓ \Downarrow	Г	\ulcorner
\Vert	\rangle	\rceil]]	↓ \downarrow	7	\urcorner

Use the pair $\setminus lefts_1$ and $\setminus rights_2$ to match height of delimiters s_1 and s_2 to the height of their contents, e.g., $\left| \begin{array}{cc} expr & right \end{array} \right|$ $\left\{ expr \right\}$ \left\Vert expr \right.

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

\sum	\sum	ſ	\int	+	\biguplus	\oplus	\bigoplus	V	\bigvee
П	\prod	∮	\oint	\cap	\bigcap	\otimes	\bigotimes	\wedge	\bigwedge
П	\coprod	Ĩſ	\iint	U	\bigcup	\odot	\bigodot	11	\bigsqcup

Standard Function Names

Correct: $\tan(at-n\pi) \longrightarrow \tan(at-n\pi)$ Function names should appear in Roman, not Italic, e.g., Incorrect: $tan(at-n\pi) \longrightarrow tan(at-n\pi)$ arcsin \arcsin arctan \arctan \arccos \arccos arg \arg \cosh \cot \coth \coth \cosh \cos \cos cot \deg \csc \csc \deg det \det \dim \dim \exp gcd \gcd hom \hom \inf \inf exp \lim \liminf \ker \ker \lg \lg \lim lim inf \log \max \limsup \ln \limsup ln \log max \Pr \Pr \min \min sec \sec \sin \sin \sinh \sinh sup \sup tan an \tanh htanh csdn. net/YEN_CSDN

6 Binary Operation/Relation Symbols

*	\ast	±	\pm	\cap	\cap	\triangleleft	\lhd
*	\star	Ŧ	\mp	U	\cup	\ ⊳	\rhd
	\cdot	П	\amalg	₩	\uplus	۵	\triangleleft
0	\circ	•	\odot	П	\sqcap	› ▷	\triangleright
•	\bullet	\ominus	\ominus	⊔	\sqcup	⊴	\unlhd
Ö	\bigcirc	⊕	\oplus	\wedge	\wedge		\unrhd
\lambda	\diamond	0	\oslash	\ V	\vee \vee	∇	\bigtriangledown
	\times		\otimes		\dagger	$\stackrel{\vee}{\triangle}$	\bigtriangleup
×		8	•	†			
÷	\div	\	\wr	‡	\ddagger	\ <u>\</u>	\setminus
•	\centerdot		\Box		\barwedge		\veebar
*	\circledast	Ш	\boxplus	人	\curlywedge	Υ	\curlyvee
0	\circledcirc		\boxminus	<u> </u>	\Cap	U	\Cup
\ominus	\circleddash		\boxtimes	\perp	\bot	T	\top
÷	\dotplus		\boxdot	<u>T</u>	\intercal		\rightthreetimes
*	\divideontimes		\square	$\overline{\wedge}$	\doublebarwedge	\rightarrow	\leftthreetimes
=	\equiv	\leq	\leq	\geq	\geq	\perp	\perp
\cong	\cong	\prec	\prec	−	\succ		\mid
\neq	\neq	≟	\preceq	≥	\succeq	ij	\parallel
\sim	\sim	≪	\11	≫	\gg	×	\bowtie
\simeq	\simeq	<u> </u>	\subset	S	\supset	M	\Join
\approx	\approx	\subseteq	\subseteq	\supseteq	\supseteq	×	\ltimes
~	\asymp		\sqsubset	\exists	\sqsupset	×	\rtimes
$\stackrel{\frown}{=}$	\doteq		\sqsubseteq	⊒	\sqsupseteq	~	\smile
	•	<u></u> ⊢	\sqsubseteq \dashv	= ⊢	\sqsupseteq \vdash		\frown
\propto	\propto		•		•	<u></u>	\notin
=	\models	\in	\in	∋	\ni	∉	\notin
\cong	\approxeq	\leq	\leqq	\geq	\geqq	≶	\lessgtr
\sim	\thicksim	\leq	$\$ leqslant	\geqslant	\geqslant	\leq	\lesseqgtr
~	\backsim	≨	\lessapprox	≳	\gtrapprox	≦	\lesseqqgtr
~	\backsimeq	≈ ≪	\111	≈ >>>	\ggg	WAIVAIIWIIAVIAW	\gtreqqless
<u>_</u>	-					\leq	
	\triangleq	<	\lessdot	⋗	\gtrdot	=	\gtreqless
<u></u>	\circeq	₩ 8.4.2.4 M 2.A	\lesssim	~	\gtrsim	<	\gtrless
^	\bumpeq	<	\eqslantless	≥	\eqslantgtr	€	\backepsilon
≎	\Bumpeq	$\stackrel{\sim}{\sim}$	\precsim	\sim	\succsim	Ŏ	\between
÷	\doteqdot	≋	\precapprox	≿ ≈	\succapprox	ф	$\protect\pro$
\approx	\thickapprox	⋐	\Subset	∋	\Supset	1	\shortmid
≒.	\fallingdotseq	⊑	\subseteqq	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	\supseteqq	$\overline{}$	\slash smallfrown
≓	\rightarrow risingdotseq		\sqsubset		\sqsupset	\smile	\slash smallsmile
\propto	\varpropto	\preccurlyeq	\preccurlyeq	\succcurlyeq	\succcurlyeq	⊩	\Vdash
∴.	\therefore	\Rightarrow	\curlyeqprec	\succ	\curlyeqsucc	⊨	\vDash
•:•	\because	◀	$\$ \blacktriangleleft	•	$\$ blacktriangleright	II⊢	\Vvdash
==	\eqcirc	\leq	\trianglelefteq	\trianglerighteq	\trianglerighteq	П	\shortparallel
\neq	\neq	\triangleleft	\vert riangleleft	\triangleright	\vert riangleright	Ħ	\nshortparallel
≇	\ncong	d	\nleq	*	\ngeq	đ	\nsubseteq
	-	<i>‡</i>		7		≠	-
†	\nmid	<u></u>	\nleqq	<i>≨</i>	\ngeqq	#	\nsupseteq
#	\nparallel	\$\$\$\$	\nleqslant	7	\ngeqslant	₹	\nsubseteqq
ł	\nshortmid		\nless	>	\ngtr	⊭	\nsupseteqq
Ħ	\nshortparallel	1	\nprec	7	\nsucc	⊊	\subsetneq
~	\nsim	≠,	\npreceq	≱	\nsucceq		\supsetneq
¥	\nVDash	≨	\precnapprox	æ	\succnapprox	₹	\subsetneqq
¥	\nvDash	$\stackrel{\sim}{\sim}$	\precnsim	,>,	\succnsim	\neq	\supsetneqq
¥	\nvdash	≨	$\label{lnapprox}$	≩	\gnapprox	⊊	\varsubsetneq
\triangleleft	\ntriangleleft	≨	\lneq	\geq	\gneq	⊋	\varsupsetneq
∄	\ntrianglelefteq	≨	\lneqq	≩	\gneqq	≨	\varsubsetneqq
\not	\ntriangleright	#^\$^#\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\	\label{lnsim}	#V3V#V4V#V8Y8Y#X	\gnsim	⊋	\varsupsetneqq
⊭	\n	≨	$lem:lemma_lemma$	≩	\gvertneqq		https://blog.csdn.net/YEN_CSDN

7 Arrow symbols

$\begin{array}{c} \leftarrow \\ \leftarrow \\ \rightarrow \\ \rightarrow \\ \leftrightarrow \\ \leftrightarrow \end{array}$	\leftarrow \Leftarrow \rightarrow \Rightarrow \leftrightarrow \Leftrightarrow	$\begin{array}{c} \leftarrow \\ \leftarrow \\ \rightarrow \\ \rightarrow \\ \leftarrow \\ \leftrightarrow \\ \end{array}$	\longleftarrow \Longleftarrow \longrightarrow \Longrightarrow \longleftrightarrow \Longleftrightarrow	$\uparrow \\ \uparrow \\ \downarrow \\ \downarrow \\ \uparrow \\ \updownarrow \\ \uparrow \\ \downarrow \\ \downarrow \\ \uparrow \\ \downarrow \\ \uparrow \\ \downarrow \\ \downarrow \\ \uparrow \\ \downarrow \\ \downarrow$	\uparrow \Uparrow \downarrow \Downarrow \updownarrow \Updownarrow
\mapsto	\mapsto \hookleftarrow	$\stackrel{\longmapsto}{\hookrightarrow}$	\longmapsto \hookrightarrow	_	\nearrow \searrow
_	\leftharpoonup		\rightharpoonup	Ž	\swarrow
_	\leftharpoondown	\rightarrow	\rightharpoondown	× .	\nwarrow
\rightleftharpoons	\rightleftharpoons	~ →	\leadsto	`	
→	\dashrightarrow	4 – –	\dashleftarrow	⊭	\leftleftarrows
\leftrightarrows	\leftrightarrows	\Leftarrow	\Lleftarrow	₩-	\twoheadleftarrow
\leftarrow	\leftarrowtail	\leftarrow	$\label{looparrowleft}$	\leftrightharpoons	\leftrightharpoons
$ \leftarrow $	\curvearrowleft	O	\circlearrowleft	↰	\Lsh
$\uparrow\uparrow$	\upuparrows	1	\upharpoonleft	1	\downharpoonleft
⊸ ∘	\multimap	~~~	\leftrightsquigarrow	\Rightarrow	\rightrightarrows
\rightleftharpoons	\rightleftarrows	\Rightarrow	\rightrightarrows	\rightleftharpoons	\rightleftarrows
\longrightarrow	\twoheadrightarrow	\longrightarrow	\rightarrowtail	\rightarrow	\looparrowright
\rightleftharpoons	\rightleftharpoons	\curvearrowright	\curvearrowright	\bigcirc	\circlearrowright
Ļ	\Rsh	$\downarrow\downarrow$	\downdownarrows	1	\upharpoonright
ļ	\downharpoonright	~ →	\rightsquigarrow		
↔	\nleftarrow	\rightarrow	\nrightarrow	#	\nLeftarrow
\Rightarrow	\nRightarrow	\leftrightarrow	\nleftrightarrow	⇔	\n

8 Miscellaneous symbols

∞	$\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	\forall	\forall	k	\Bbbk	60	\wp
∇	\nabla	3	\exists	*	\bigstar	_	\angle
∂	\partial	∄	\nexists		\diagdown	4	\measuredangle
ð	\eth	Ø	\emptyset	/	\diagup	⋖	\sphericalangle
*	\clubsuit	Ø	\varnothing	\Diamond	\Diamond	C	\complement
\Diamond	\diamondsuit	\imath	\imath	F	\Finv	∇	\triangledown
\Diamond	\heartsuit	J	\jmath	Ð	\Game	\triangle	\triangle
^	\spadesuit	ℓ	\ell	\hbar	\hbar	Δ	\vartriangle
• • •	\cdots	ſſſſ	\iiiint	\hbar	\hslash	*	\blacklozenge
:	\vdots	ſſſ	\iiint	\Diamond	\lozenge		\blacksquare
	\ldots	ĴĴ	\iint	Ω	\mho	A	\blacktriangle
٠	\ddots	#	\sharp	,	\prime	▼	\blacktrinagledown
3.	\Im	b	\flat		\square	1	\backprime
\Re	\Re	Ц	\natural	$\sqrt{}$	\surd	(S)	\circledS

9 Math mode accents

\acute{a}	\acute{a}	\bar{a}	$\text{ar{a}}$	Á	\Acute{\Acute{A}}	$ar{ar{A}}$	\Bar{\Bar{A}}
$reve{a}$	$\verb \breve {a} $	\check{a}	$\operatorname{\check}\{a\}$	Ă	\Breve{\Breve{A}}	Ă	$\Check{\Check{A}}$
\ddot{a}	\dot{a}	\dot{a}	\dot{a}	Ä	$\Ddot{\Ddot{A}}$	Å	\Dot{\Dot{A}}
\grave{a}	$\texttt{\grave}\{a\}$	\hat{a}	\hat{a}	À	\Grave{\Grave{A}}	$\hat{\hat{A}}$	\Hat{\Hat{A}}
\tilde{a}	\hat{a}	\vec{a}	$\operatorname{\vec}\{a\}$	$ ilde{ ilde{A}}$	$Tilde{Tilde{A}}$	$ec{ec{A}}$	$\Vec{\Vec{A}}$

10 Array environment, examples

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

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

 $f(z) = \left\{ \left(\sum_{z^2}+\cos z \right) & \mbox{for} & |z| < 0 & \mbox{for} & 3\leq |z| < 0 & \mbox{for} & 3\leq |z| < 0 \\ & \mbox{for} & |z| > 5 \\ & \mbox{for} & \mbox{for} & |z| > 5 \\ & \mbox{for} & \mbox{for} & \mbox{for} & \mbox{for} & \mbox{for} \\ & \mbox{for} & \mbox{for} & \mbox{for} & \mbox{for} \\ & \mbox{for} & \mbox{for} & \mbox{for} & \mbox{for} & \mbox{for} \\ & \mbox{for} & \mbox{for} & \mbox{for} & \mbox{for} & \mbox{for} \\ & \mbox{for} \\ & \mbox{for} & \mbox{f$

$$f(z) = \begin{cases} \overline{\overline{z^2} + \cos z} & \text{for } |z| < 3\\ 0 & \text{for } 3 \le |z| \le 5\\ \sin \overline{z} & \text{for } |z| > 5 \end{cases}$$

11 Other Styles (math mode only)

 $\textbf{Caligraphic letters: \$\backslash MAHCAl\{A\}\$ etc.: } \mathcal{ABCDEFGHIJKLMNOPQRSTUVWXYZ}$

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

 $\mathbf{Mathfrak} \ \ \mathbf{letters:} \ \ \mathbf{Mathfrak} \ \mathbf{A} \ \mathbf{S} \ \mathrm{etc.:} \ \ \mathbf{MBCDEFOSTIMBDPQRSTUDMXNJabeta} \ \mathbf{abc123} \ \mathbf{abc123} \ \mathbf{mbc123} \ \mathbf{mb$

 $\textbf{Math Sans serif letters: $\mathbb{A}BCDEFGHIJKLMNOPQRSTUVWXYZabc123}$

 $\label{lem:mathbold letters: $\mathbb{A}BCDEFGHIJKLMNOPQRSTUVWXYZabc123}$

Math bold italic letters: define \def\mathbi#1{\textbf{\em #1}} then use $\$ then use $\$ ab c 123

12 Font sizes

Math Mode:

 $\int f^{-1}(x - x_a) dx$ $\int f^{-1}(x - x_a) dx$ $\int f^{-1}(x - x_a) dx$ $\int f^{-1}(x - x_a) dx$

Text Mode:

\tiny = smallest
\scriptsize = very small
\footnotesize = smaller
\small = small

$$\label{eq:large} \begin{split} & | \texttt{large} = large \\ & | \texttt{Large} = LARGE \\ \end{aligned}$$

\normalsize = normal

 $\label{eq:huge} \begin{array}{l} \text{huge} = huge \\ \text{Huge} = Huge \end{array}$

13 Text Mode: Accents and Symbols

ó	\'{o}	ö	\"{0}	ô	\^{o}	ò	\'{o}	õ	\~{o}	ō	\={o}	ş	\d s
ò	\.{o}	ŏ	\u{o}	ő	\H{o}	oo	\t{oo}	Q	\c{o}	Ò	\d{o}	ŝ	\r s
Ō	\b{o}	Å	\AA	å	\aa	ß	\ss	1	\i	J	\j	ś	\H s
Ø	\0	$\widehat{\mathbf{s}}$	\t s	š	\v s	Ø	\0	\P	\ P	§	\S		
æ	\ae	Æ	\AE	t	\dag	‡	\ddag	(c)	\copyright	£	\pounds		

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