

L^AT_EX3 入门

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```
\cs_new:Npn \tex_sum:nn  #1 #2
{
  \fp_set:Nn \l_tmpa_fp { #1 + #2 }
  \fp_use:N \l_tmpa_fp
}

\tex_sum:nn { 2 } { 4 }
```

Parameters

Arguments

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第 1 部分

为什么要出现 \LaTeX 3

长话短说， \LaTeX 3 的出现主要是为了解决如下的一些问题

- 提供一致的命名方案，包括 \TeX 原语；
- 区分 \LaTeX 命令和函数，并根据他们的功能划分模块；
- 提供了一个简单灵活的参数展开控制方案；
- 提供了一系列的常见数据结构；
- 一种 \TeX 编程环境，在这种环境中，所有空白都被忽略。

1.1 function

Function ▶ $\backslash\text{cs_new:Npn}$ ($Nn|cn|cpn$) 1

$\backslash\text{ExplSyntaxOn}$
 $\backslash\text{cs_new:Npn } \backslash\text{_my_cmd:n\#1 } \{i\sim\text{love}\sim\#1!\}$
 $\backslash\text{_my_cmd:n}\{fish\}$
 $\backslash\text{ExplSyntaxOff}$

i love fish!

Function ▶ $\backslash\text{cs_new:Npx}$ ($Nx|cx|cpx$) 2

$\backslash\text{ExplSyntaxOn}$
 $\backslash\text{cs_new:Npx } \backslash\text{_my_cmdx:n\#1 } \{i\sim\text{love}\sim\#1!\}$
 $\backslash\text{_my_cmd:n}\{fish\}$
 $\backslash\text{ExplSyntaxOff}$

i love fish!

演示 3

Function ▶ \cs_set:Npn (Nn | cn | cpn)

3

```
\ExplSyntaxOn
\cs_set:Npn \foo_cmd:n #1 {i~love~#1}
\foo_cmd:n{fish}
\ExplSyntaxOff
```

i love fish

1.2 COLOR

Function ▶ \color_group_begin: \color_group_end:

4

```
\ExplSyntaxOn
\cs_meaning:N \color_group_begin: \par
\cs_meaning:N \color_group_end:
\ExplSyntaxOff
```

\begingroup
\endgroup

Function ▶ \color_set:nn{<name>}{<color expression>}

5

```
\ExplSyntaxOn
\color_set:nn{main}{red!30!cyan}
\color_select:n{main}
\centering
\LaTeX
\hrule
\ExplSyntaxOff
```

TeX

Function ▶ \int_format:n \fp_format:n

6

```
\ExplSyntaxOn
\seq_new:N \l_before_seq
\seq_new:N \l_after_seq
\cs_generate_variant:Nn \regex_extract_all:nnN {nxN}
\cs_set:Npn \int_format:n #1#2 {
  \regex_extract_all:nnN {\d{1,#2}} {#1} \l_tmpa_seq
  \seq_use:Nn \l_tmpa_seq{~}
}
\cs_set:Npn \fp_format:n #1#2 {
  \regex_split:nnN {\.} {#1} \l_tmpb_seq
  \regex_extract_all:nxN {\d{1,#2}} {\seq_item:Nn \l_tmpb_seq{1}} \l_before_seq
  \regex_extract_all:nxN {\d{1,#2}} {\seq_item:Nn \l_tmpb_seq{2}} \l_after_seq
  \seq_use:Nn \l_before_seq{~} . \seq_use:Nn \l_after_seq{~}
}
\int_format:n{123456789}{3}\par
\fp_format:n{152.354126859}{4}\par
\int_format:n{23354862}{2}\par
\fp_format:n{0.1010010001000010}{3}
\ExplSyntaxOff
```

123 456 789
152.3541 2685 9
23 35 48 62

0.101 001 000 100 001 0

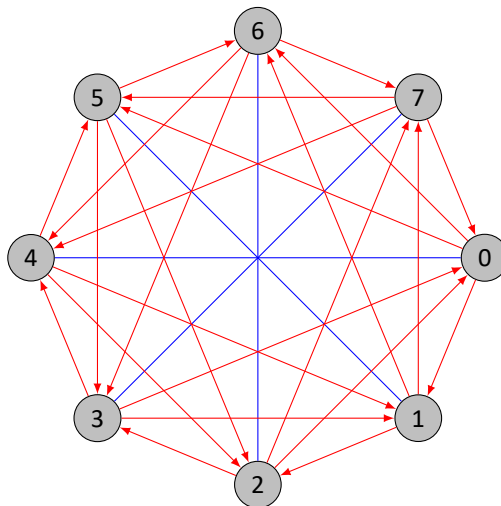
Function ▶ picture

7

```

\ExplSyntaxOn
\centering
\begin{tikzpicture}
\int_step_inline:nnn{0}{7}
{
  \node[circle,fill=gray!50,draw] (a#1) at (-#1*45\c_colon_str 3){#1};
  \draw[blue] (0,0) -- (a#1);
}
\int_step_inline:nnn{0}{7}
{
  \draw[-latex,red] (a#1) -- (a\int_mod:nn{#1+1}{8});
}
\int_step_inline:nnn{0}{7}
{
  \int_step_inline:nnn{#1+5}{#1+6}
  {
    \draw[-latex,red] (a#1) -- (a\int_mod:nn{##1}{8});
  }
}
\end{tikzpicture}
\ExplSyntaxOff

```



Function ▶ expand \d

8

```

\def\aaa{
\def\b{\a\a}
\def\c{\b\b}
展开一次:
\expandafter\def\expandafter\d\expandafter{\c}
\meaning\d \par
展开两次:
\expandafter\expandafter\expandafter\expandafter\expandafter\expandafter
\def\expandafter\expandafter\expandafter\expandafter\expandafter\expandafter
\d\expandafter\expandafter\expandafter\expandafter\expandafter\expandafter
{\expandafter\expandafter\c}
\meaning\d \par
递归展开:
\edef\d{\c}
\meaning\d

```

展开一次: `macro:->\b\b`
 展开两次: `macro:->\a \a \a \a`
 递归展开: `macro:->aaaaaaaaaaaa`

Function ▶ `noexpand \b`

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```
\def\{a}{
\def\{b}{
\def\{c}{
(方法一)
\edef\{d{\a\noexpand\b\c}
\meaning\d \par
(方法二)
\toks0={\b}
\edef\{d{\a\the\toks0\c}
\meaning\d \par
(方法三)
\expandafter\expandafter\expandafter
\def\expandafter\expandafter\expandafter
\d\expandafter\expandafter\expandafter
{\expandafter\a\expandafter\b\c}
\meaning\d
```

(方法一) `macro:->a\b c`
 (方法二) `macro:->a\b c`
 (方法三) `macro:->a\b c`

Function ▶ `\items`

10

```
\newcount\ljguo
\ljguo = 1
{\catcode`\-=13
\catcode`\*=13
\gdef\beginitem{\par\noindent\begingroup\catcode`\-=13\catcode`\*=13
\def- {\par\noindent\the\ljguo.\advance\ljguo by 1\hskip 1pt\ignorespaces}
\def* {\par\noindent\hskip 4pt$\bullet$\hskip 3pt\ignorespaces}}
\def\enditem{\par\endgroup}
{\LARGE Markdown}
\vskip 0.3cm
\beginitem
- this is item one.
- this is item two.
* this is iitem one.
* this is iitem two.
- this is item three.
* this is iitem one.
* this is iitem two.
- this is item four.
\enditem
```

Markdown

1. this is item one.
2. this is item two.
 - this is iitem one.
 - this is iitem two.
3. this is item three.
 - this is iitem one.

- this is item two.
4. this is item four.

Function ► \getlength

```
\def\length#1{\count0=0 \getlength#1\end \number\count0}
\def\getlength#1{\ifx#1\end \let\next=\relax
\else\advance\count0 by 1\relax \let\next=\getlength\fi \next}
\length{asdasf}
```

6

Function ► \tokenfill

```
\def\tokenfill#1{\leaders\hbox to 0.8em{\hss #1 \hss}\hfill}
\noindent\tokenfill{\$ \triangleright\$} \par
begin \tokenfill{\$ \cdot\$} end
```

```
begin ..... end
```

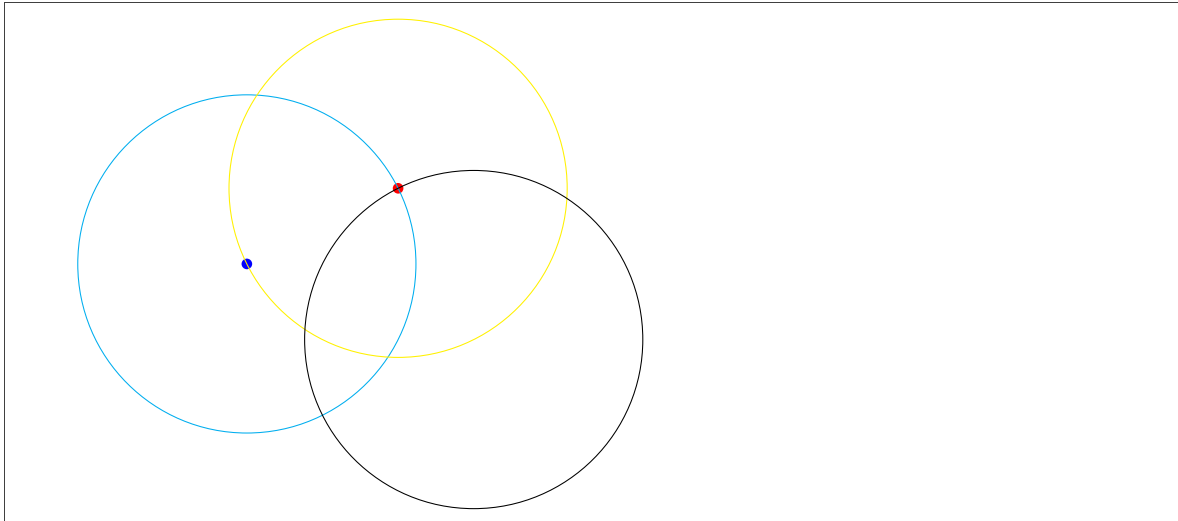
Function ► \length

```

\ExplSyntaxOn
\makeatletter
\cs_set:Npn \pgf_length:N #1 {
  \fp_set:Nn \l_tmpa_fp {\dim_to_fp:n{\pgf@x}}
  \fp_set:Nn \l_tmpb_fp {\dim_to_fp:n{\pgf@y}}
  \tl_set:Nx #1{
    \fp_to_dim:n{\fp_eval:n{(\l_tmpa_fp^2+\l_tmpb_fp^2)^(0.5)}}
  }
}
\cs_set_eq:NN \length \pgf_length:N
\def\getlengthtomarco#1#2{
  \path #1;
  \length#2
}
\makeatother
\ExplSyntaxOff

\begin{tikzpicture}
  \fill[red] (3,2) coordinate(a) circle(2pt);
  \fill[blue] (1,1) coordinate(b) circle(2pt);
  \coordinate(c) at ($(b)-(a)$);
  \path (c);
  \length{\r %r = length "(b) - (a)"}
  \draw[cyan] (b) circle (\r);
  \draw[yellow] (a) circle (\r);
  \getlengthtomarco{(1,2)}{\r}
  \draw[] (4,0) circle (\r);
\end{tikzpicture}

```



Function ▶ \@ifnextchar

14

```
\makeatletter
\def\@cmd[#1]#2{\textcolor{red}{#1} and (#2)}
\def\cmd{
  \@ifnextchar[{\@cmd}{\@cmd[default]}
}
\cmd{aaa}\par
\cmd[bbb]{aaa}

\def\@cmd[#1]#2{\c@cmd{#1} and \textcolor{red}{#1} and (#2)}
\def\cmd#1{
  \def\c@cmd{#1}\@ifnextchar[{\@cmd}{\@cmd[default]}
}
\cmd{aaa}{ccc}\par
\cmd{aaa}[bbb]{ccc}
\makeatother
```

default and (aaa)
 bbb and (aaa)
 aaa and default and (ccc)
 aaa and bbb and (ccc)

Function ▶ \@ifstar

15

```
\catcode`\@=11
\def\cmd{\@ifstar{\textcolor{red}}{\textcolor{blue}}}{%}
\cmd*{aaa}\par
\cmd{aaa}
\catcode`\@=12
```

aaa
 aaa

Function ▶ \mark

16

```
\def\mark#1#2{%
\tikz[remember picture,baseline]{%
\node[inner sep=0pt,outer sep=0pt,anchor=base,fill=red!30,align=center] (#1){#2};}}

\begin{align}\label{eq:1}
\mark{label}{\$a^2 + b^2 = c^2\$}
```

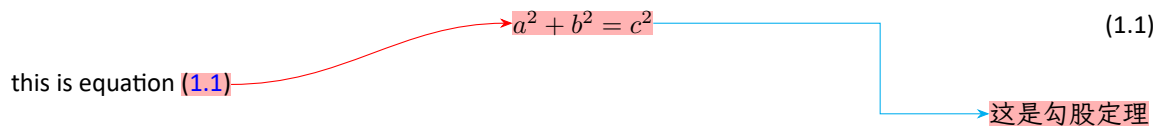


```

\end{align}
this is equation \mark{ref}{\eqref{eq:1}}
\tikz[overlay,remember picture]\draw[red,Stealth-](label.180) to[out=180,in=0] (ref.0);

\hfill \mark{margin}{这是勾股定理}
\tikz[overlay,remember picture]\draw[cyan,-Stealth](label.0) --++(3,0)|- (margin.180);

```



Function ▶ Array

17

```

\ExplSyntaxOn
\seq_new:N \l_node_row_seq
\seq_new:N \l_node_tmp_seq
\cs_set:Npn \GetArray #1 {
  \seq_set_split:Nnn \l_node_row_seq {;} {#1}
  \int_step_inline:nn{\seq_count:N \l_node_row_seq}
  {
    \seq_if_exist:cF {l_node_row_##1_seq}
    {
      \seq_new:c {l_node_row_##1_seq}
    }
    \exp_args:Ncx\seq_set_from_clist:Nn {l_node_row_##1_seq} {\seq_item:Nn
      \l_node_row_seq{##1}}
  }
}

\cs_set:Npn \PrintArray [#1][#2] {
  \tl_if_empty:nTF { #1 }
  {
    \tl_if_empty:nTF { #2 }
    {
      \seq_use:Nn \l_node_row_seq {,}
    }
    {
      \int_step_inline:nn{\seq_count:N \l_node_row_seq}
      {
        \seq_put_right:Nn \l_node_tmp_seq {\seq_item:cn {l_node_row_##1_seq}{#2}}
      }
      \seq_use:Nn \l_node_tmp_seq {,}
    }
  }
  {
    \tl_if_empty:nTF {#2}
    {
      \seq_use:cn {l_node_row_#1_seq}{,}
    }
    {
      \seq_item:cn {l_node_row_#1_seq}{#2}
    }
  }
}
\ExplSyntaxOff

\GetArray
{

```

```

    A,B,C;
    D,E,F;
    G,H,I
}
\PrintArray[] [] \par
\PrintArray[1] [] \par
\PrintArray[] [2] \par
\PrintArray[1] [2]

```

```

A,B,C,D,E,F,G,H,I
A,B,C
B,E,H
B

```