



L<sup>A</sup>T<sub>E</sub>X 绘图

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封面代码：✂

使用彩色

要在 L<sup>A</sup>T<sub>E</sub>X 中使用彩色，可以调用 `xcolor` 宏包

```
\usepackage{xcolor}
```

使用某种颜色之前，首先要给出定义，命令格式为：

```
\definecolor{<颜色名>}{<模式>}{<颜色值>}
```

其中

<颜色名>: 用户给出的字符串

<模式>: 系统预定义的彩色模式，  
常用的有 `rgb`, `cmyk`, `wave` 等。

<颜色值>: 与彩色模式有关

`rgb`:  $(0, 0, 0) \sim (1, 1, 1)$

`cmyk`:  $(0, 0, 0, 0) \sim (1, 1, 1, 1)$

`wave`:  $363 \sim 814$

以下颜色已经预定义：

 black


 gray

 olive

 teal

 blue

 green

 orange

 violet


 brown

 lightgray

 pink

white

 cyan

 lime

 purple

 yellow

 darkgray

 magenta

 red

例如

```
\definecolor{red}{rgb}{1,0,0}  
\definecolor{purple}{cmyk}{0.45,0.86,0,0}  
\definecolor{yellow}{cmyk}{0,0,1,0}
```

```
\textcolor{red}{red texts}\  
\textcolor[rgb]{1,0,0}{red texts}\  
\color{blue} blue texts\  
\color[wave]{600} 波长为  
600 nm 的光波颜色}
```

red texts

red texts

blue texts

波长为 600 nm  
的光波颜色

指定颜色时，可以用颜色表达式代替颜色名。常用的颜色表达式有

$\langle \text{颜色 1} \rangle ! \langle \text{百分数} \rangle ! \langle \text{颜色 2} \rangle$

$:= \langle \text{颜色 1} \rangle * \langle \text{百分数} \rangle \% + \langle \text{颜色 2} \rangle * (1 - \langle \text{百分数} \rangle \%)$

$\langle \text{颜色} \rangle ! \langle \text{百分数} \rangle := \langle \text{颜色} \rangle ! \langle \text{百分数} \rangle ! \langle \text{白色} \rangle$

$-\langle \text{颜色} \rangle$ : 补色。

```
\textcolor{red!40}{test colors}\\
```

```
\textcolor{red!40!green}{test colors}\\
```

```
\textcolor{-red}{test colors}
```

test colors

test colors

test colors



使用已知颜色定义新颜色:

```
\colorlet{darkred}{red!50!black}  
\textcolor{darkred}{dark red}
```

dark red

背景色:

```
\pagecolor{<页面颜色>}
```

```
\colorbox{<盒子颜色>}{<文字>}
```

```
\fcolorbox{<边框颜色>}{<盒子颜色>}{<文字>}
```

```
\fcolorbox{blue}{blue!15}
```

```
{\color{red}彩色盒子}
```

彩色盒子

`xcolor` 与 `colortbl` 两个宏包合用，可以制作彩色表格，具体内容请参考宏包说明。

# 绘图

L<sup>A</sup>T<sub>E</sub>X 有很多绘图宏包，其中功能强大的有 `pstricks` 和 `pgf`。这里以 `pgf` 的前端宏包 `tikz` 为例。

绘制简单图形：

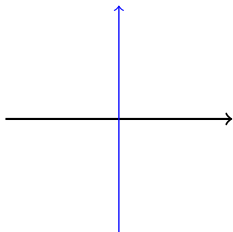
```
\tikz <绘图命令>;
```

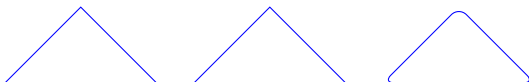
复杂图形：

```
\begin{tikzpicture}[选项]  
  <绘图命令1>;  
  <绘图命令2>;  
  ... ..  
  <绘图命令n>;  
\end{tikzpicture}
```

## 直线

```
\begin{tikzpicture}  
\draw[->,thick] (-1.5,0) -- (1.5,0);  
\draw[->,line width=0.5pt,  
blue] (0,-1.5) -- (0,1.5);  
\end{tikzpicture}
```

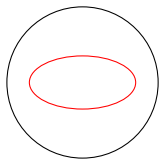




```
\begin{tikzpicture}[color=blue,scale=0.5]
\draw (0,0) --(4,0) --(2,2) --(0,0);
\draw[xshift=5cm] (0,0) --(4,0) --(2,2) -- cycle;
\draw[xshift=10cm, rounded corners] (0,0) --(4,0)
--(2,2) -- cycle;
\end{tikzpicture}
```

## 圆，椭圆

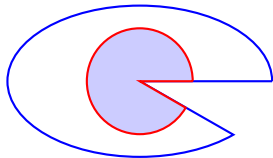
```
\begin{tikzpicture}  
\draw (0,0) circle (1cm);  
\draw[red] (0,0)  
  ellipse (20pt and 10pt);  
\end{tikzpicture}
```





## 圆弧

```
\begin{tikzpicture}  
\draw[blue,thick] (0,0)  
  arc (0:315:1.75cm and 1cm)  
  -- (-1.75,0) -- ++(1.75,0);  
\filldraw[draw=red,fill=blue!20,thick↔  
  ] (-1.05,0)  
  arc (0:330:0.7)  
  -- (-1.75,0) -- ++(0.7,0);  
\end{tikzpicture}
```



注意：arc 之前的参数并非圆心坐标，而是圆弧起点坐标。

## 长方形

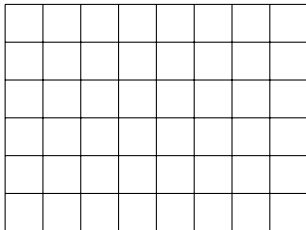
```
\begin{tikzpicture}  
\draw[blue,thick] (1,1)  
rectangle (3,4);  
\end{tikzpicture}
```



```
\begin{tikzpicture}  
\filldraw[color=blue!30!red]  
(1,1) rectangle +(2,3);  
\end{tikzpicture}
```

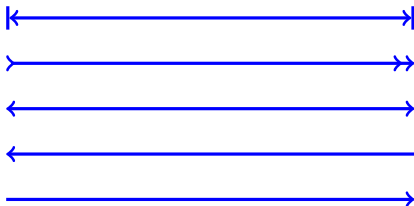


## 网格



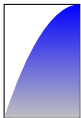
```
\begin{tikzpicture}  
\draw [step=0.5] (0,0) grid (4,3);  
\end{tikzpicture}
```

## 箭头

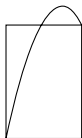
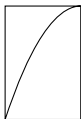


```
\begin{tikzpicture}[very thick,blue,scale=0.6]
\draw [->] (0,0) --(9,0);
\draw [<-] (0,1) --(9,1);
\draw [<->] (0,2) --(9,2);
\draw [>->>] (0,3) --(9,3);
\draw [|<->|] (0,4) --(9,4);
\end{tikzpicture}
```

## 抛物线



```
\begin{tikzpicture}  
\draw(0,0)rectangle(1,1.5)(0,0) parabola (1,1.5);  
\shade[top color=blue, bottom color=gray!50]  
(0,0) parabola[bend at end] (1,1.5) |-(0,0);  
\end{tikzpicture}
```



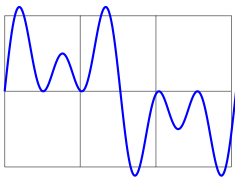
```
\begin{tikzpicture}  
\draw (0,0) rectangle (1,1.5)  
(0,0) parabola[bend at end] (1,1.5);  
\draw[xshift=3cm] (0,0) rectangle (1,1.5)  
(0,0) parabola bend (.75,1.75) (1,1.5);  
\end{tikzpicture}
```

## 一般曲线

```
\begin{tikzpicture}  
\filldraw [gray] (0,0) circle (2pt)  
(1,1) circle (2pt)  
(2,1) circle (2pt)  
(2,0) circle (2pt);  
\draw [red, very thick]  
  (0,0) .. controls (1,1)  
    and (2,1) .. (2,0);  
\end{tikzpicture}
```



## 函数



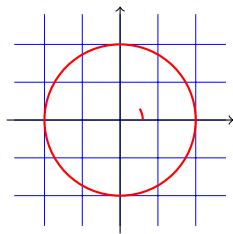
```

\begin{tikzpicture}
\draw [help lines] (0,0) grid (3,2);
\draw [blue, thick, x=0.0085cm, y=1cm,
declare function={sines(\t,\a,\b)=1 +
  0.5*(sin(\t)+sin(\t*\a) +sin(\t*\b));}]
plot [domain=0:360, samples=144, smooth]
(\x,{sines(\x,3,5)});
\end{tikzpicture}

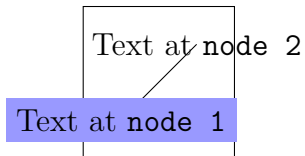
```



```
\begin{tikzpicture}
\draw[step=.5cm,blue,very thin]
  (-1.4,-1.4) grid (1.4,1.4);
\draw[->] (-1.5,0) -- (1.5,0);
\draw[->] (0,-1.5) -- (0,1.5);
\draw[red,thick] (0,0)
  circle (1cm);
\draw[red,thick] (3mm,0mm)
  arc (0:30:3mm);
\end{tikzpicture}
```

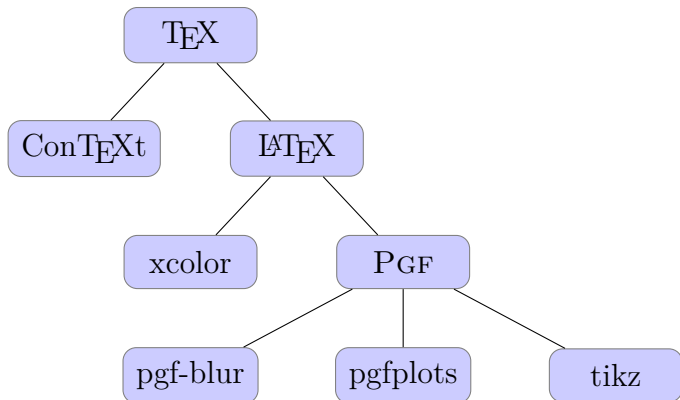


## 添加文本



```
\begin{tikzpicture}  
\draw (0,0) rectangle (2,2);  
\draw (0.5,0.5) node [fill=blue!40]  
{Text at \verb!node 1!}  
-- (1.5,1.5) node {Text at \verb!node 2!};  
\end{tikzpicture}
```

## 示意图



```
\tikzset{box/.style = {rectangle, rounded corners=5pt,  
minimum width =50pt, minimum height =20pt,  
inner sep=5pt, draw=gray, fill=blue!20}}  
\begin{tikzpicture}[sibling distance =80pt]  
\node[box] {\TeX}  
  child {node[box] {Con\TeX t}}  
  child { node[box] {\LaTeX}  
    child {node[box] {xcolor}}  
    child {node[box] {\scshape Pgf}  
      child {node[box] {pgf-blur}}  
      child {node[box] {pgfplots}}  
      child {node[box] {tikz}}}}};  
\end{tikzpicture}\newpage
```

## 填充

```
\begin{tikzpicture}[scale=5]
\filldraw[fill=red,
draw=blue!50!black]
(0,0) -- (3mm,0mm) arc
(0:30:3mm) -- cycle;
\end{tikzpicture}
```



## 矩阵

```
\begin{tikzpicture}
\matrix (magic) [matrix of nodes,
  row 2 column 3/.style=blue]
{
8 & 1 & 6 \\
3 & 5 & 7 \\
4 & 9 & 2 \\
};
\draw[thick,red,->] (magic-1-1)
|- (magic-2-3);
\end{tikzpicture}
```

8	1	6
3	5	7
4	9	2

## 阴影与渐变色



```
\begin{tikzpicture}[rounded corners, ultra thick]
\shade[top color=blue,bottom color=red]
  (0,0) rectangle +(2,1);
\shade[left color=yellow,right color=white]
  (3,0) rectangle +(2,1);
\shadedraw[inner color=yellow,outer color=black,
  draw=yellow] (6,0) rectangle +(2,1);
\shade[ball color=green] (9,.5) circle (.5cm);
\end{tikzpicture}
```

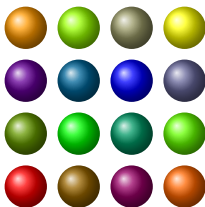
## 简单编程

光谱

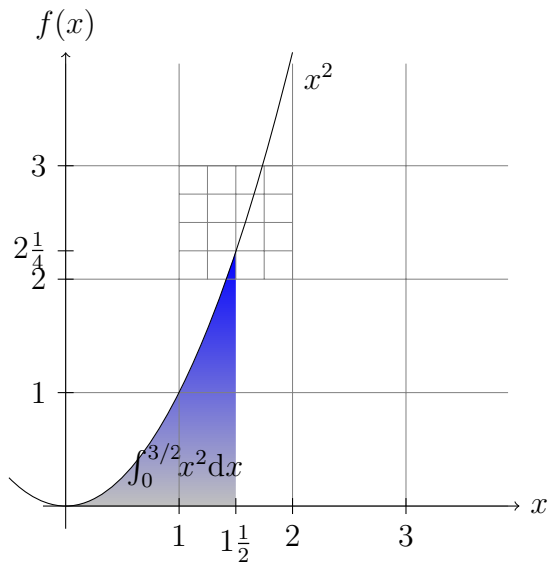


```
\begin{tikzpicture}[scale=0.6]
\foreach \lambda in{363,364,...,814}
\color[wave]{\lambda}\draw[line width=1pt]
(\lambda pt,0)--(\lambda pt, 40pt);
\end{tikzpicture}
```





```
\tikz[shading=ball,scale=0.7]
\foreach \x / \cola in {0/red,1/green,2/blue,3/yellow}
\foreach \y / \colb in {0/red,1/green,2/blue,3/yellow}
\shade[ball color=\cola!40!\colb] (\x,\y)
circle (0.4cm);
```



```
\begin{tikzpicture}[scale=1.5]
\shade[top color=blue,bottom color=gray!50]
(0,0) parabola (1.5,2.25) |- (0,0);
\draw (1.05cm,2pt) node[above]
{ $\int_0^{3/2} \! \! \! x^2 \mathrm{d}x$ };
\draw[help lines] (0,0) grid (3.9,3.9)
[step=0.25cm] (1,2) grid +(1,1);
\draw[->] (-0.2,0) -- (4,0) node[right] {$x$};
\draw[->] (0,-0.2) -- (0,4) node[above] {$f(x)$};
\foreach \x/\xtext in
{1/1, 1.5/1\frac{1}{2}, 2/2,3/3}
\draw[shift={(\x,0)}] (0pt,2pt) -- (0pt,-2pt)
node[below] {$\xtext$};
\foreach \y/\ytext in {1/1, 2/2, 2.25/2\frac{1}{4},
```

3/3}

```
\draw[shift={(0,\y)}] (2pt,0pt) -- (-2pt,0pt)
  node[left] {$\ytext$};
\draw (-.5,.25) parabola bend (0,0) (2,4)
  node[below right] {$x^2$};
\end{tikzpicture}
```



渐变色



```
\pgfdeclareverticalshading{spectrum}{100bp}  
{color(0bp)=(red!40); color(25bp)=(red!40);  
  color(35bp)=(yellow!40);  
color(45bp)=(green!40); color(55bp)=(cyan!40);  
  color(65bp)=(blue!40);  
color(75bp)=(violet!40); color(100bp)=(violet!40)}  
  
\hskip 10mm  
  
\begin{tikzpicture}[shading=spectrum]  
\shade [shading angle=135] (3,0) node  
  {\color{rgb}{1,0,1} \fontsize{35pt}{40pt}  
\selectfont Shading} circle (4);  
\shade (7.2,-4) rectangle ++(1,8);  
  
\end{tikzpicture}
```





```
\pgfdeclareradialshading{rainbow}
  {\pgfpoint{-10bp}{10bp}}
{color(0bp)=(bg);color(16bp)=(bg);
  color(20bp)=(bg!70!blue);
color(20.2bp)=(blue!40);color(20.5bp)=(blue!40);
  color(21bp)=(cyan!40);
color(21.5bp)=(green!40);   color(22bp)=(yellow!40);
  color(22.5bp)=(red!40);
color(22.7bp)=(red!40);color(22.9bp)=(red!40);
  color(23.1bp)=(red!5)}
\hspace*{-150mm}\begin{tikzpicture}[shading=rainbow]
\shade  (-20,-22) rectangle +(50,50);
\end{tikzpicture}
```