

1 Center text

```
$\centerline{Derive circle parametric equation}$
```

Derive circle parametric equation	
multiple line search(matrix block)	/\begin{bmatrix}*_{-}\end{bmatrix}
multiple line search	/\begin{bmatrix}*_{-}\end{bmatrix}

2 Greek Symbols

A α \alpha	E ε
B β	Z ζ
Γ γ	E η
Δ δ	Θ θ
E ε	I ι

3 norm, dot, abs

\cdot	.
\cdots	...
\ddots	⋮
\reflectbox{\$\ddots\$}	⋮
\vdots	⋮
\vdots	⋮
\frac{dy}{dx}	$\frac{dy}{dx}$
\dfrac{dy}{dx}	$\frac{dy}{dx}$
\frac{dy}{dx}	$\frac{dy}{dx} = \frac{d^2y}{dx^2}$
\dfrac{dy}{dx}	$\frac{dy}{dx} = \frac{d^2y}{dx^2}$
\vert \vec{u} \vert	$ \vec{u} $
\abs{\vec{u}}	$ \vec{u} $
\norm{\vec{u}}	$\ \vec{u}\ $
\vec{v}	$ \vec{v} $
\mathcal{V} \quad \mathcal{W}	$\mathcal{V} \quad \mathcal{W}$

```
\frac{\partial u}{\partial x} = h^2
\left( \frac{\partial^2 u}{\partial x^2} +
\frac{\partial^2 u}{\partial y^2} +
\frac{\partial^2 u}{\partial z^2}
\right)
```

$$\frac{\partial u}{\partial x} = h^2 \left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} \right)$$

4 Table

10	20	30	40	50
0.8	28	38	48	58
28	38	48	58	68
0.7	108	118	128	99
98	108	118	128	88

```
\begin{tabular}{|c|c|c|c|c|}
\hline
10 & 20 & 30 & 40 & 50 \\
0.8 & 28 & 38 & 48 & 58 \\
28 & 38 & 48 & 58 & 68 \\
0.7 & 108 & 118 & 128 & 99
\hline
\end{tabular}
```

```
98 & 108 & 118 & 128 & 88 \\ \hline
\end{tabular}
```

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

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

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

```
A= \begin{bmatrix}
1 & 2 & 3 \\
4 & 5 & 6 \\
7 & 8 & 9
\end{bmatrix}
```

$$A = \left| \begin{array}{ccc} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{array} \right|$$

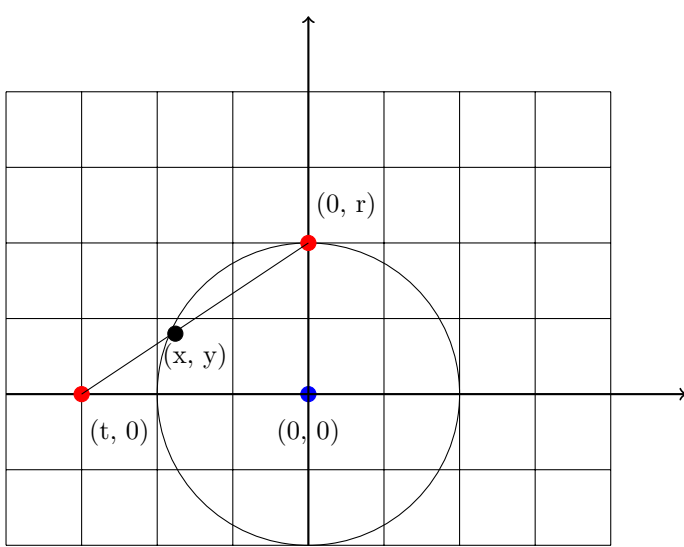
```
A= \left| \begin{array}{ccc}
1 & 2 & 3 \\
4 & 5 & 6 \\
7 & 8 & 9
\end{array} \right|
```

$$A = \begin{array}{ccc} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{array}$$

```
A= \begin{matrix}
1 & 2 & 3 \\
4 & 5 & 6 \\
7 & 8 & 9
\end{matrix}
```

$$\left[\begin{array}{ccc|c} 1 & 2 & 3 & 1 \\ 4 & 5 & 6 & 2 \\ 7 & 8 & 10 & 5 \end{array} \right]$$

```
&\left[\begin{array}{ccc|c}
1 & 2 & 3 & 1 \\
4 & 5 & 6 & 2 \\
7 & 8 & 10 & 5
\end{array}\right]
```



```
\begin{tikzpicture}[yscale=-1]
  % 4x4 grid
  \draw (-2, 0) grid (6, 6);
  % origin point
  \draw [color=blue, fill=blue] (2, 4) circle (0.1);
  % x-axis
  \draw [thick,->] (-2, 4) -- (7, 4);
  % y-axis
  \draw [thick,->] (2, 6) -- (2, -1);
  % origin label
  \node at (2, 4.5) {(0, 0)};
  \draw (2, 4) circle (2);
  \draw [color=red, fill=red] (2, 2) circle(0.1);
  \node at (2.5, 1.5){(0, r)};
  \draw [color=red, fill=red] (-1, 4) circle(0.1);
  \node at (-0.5, 4.5){(t, 0)};
  \draw (2, 2)--(-1, 4);
  \node at (0.5, 3.5){(x, y)};
  \draw [color=black, fill=black] (0.24, 3.2) circle(0.1);
\end{tikzpicture}\\ \ \
```

5 Small Subscript

```
https://tex.stackexchange.com/questions/262295/make-subscript-size-smaller-always

\documentclass{article}
\catcode'\_=\active
\newcommand_{[1]{\ensuremath{\sb{\scriptscriptstyle #1}}}}
Original: $A_{\scriptstyle 1}^2$ \\
new: $A_{\scriptscriptstyle 1}^2$ \\
```

Original: A_1^2
new: A_1^2

6 Matrix dots

$$L_k = I + v_k e_k^* = \begin{bmatrix} 1 & & & & \\ & \ddots & & & \\ & & 1 & & \\ & & l_{k+1,k} & & \\ & & \vdots & \ddots & \\ & l_{m,k} & & & 1 \end{bmatrix}$$

```
L_k = I + v_k e_{k}^{*} = \begin{bmatrix}
1 & & & & \\
& \ddots & & & \\
& & 1 & & \\
& & l_{k+1,k} & & \\
& & \vdots & \ddots & \\
& l_{m,k} & & & 1 \end{bmatrix} \\
```

7 Change the width and height of a page

```
%
\usepackage{geometry}
\geometry{paperwidth=18cm, paperheight=80cm}
```

8 Math Mode Text

$x + y = z$
 $x + y = z$

This is long text for math mode x, y, z

$x + y = z$
 $x + y = z$

```
x + y &= z \\
x + y &= z \\
\intertext{This is long text for math mode $x, y, z$}
x + y &= z \\
x + y &= z \\
```

$x + y = z$
 $x + y = z$ (Where is x)
 $x + y = z$
 $x + y = z$

```
x + y &= z \\
x + y &= z \tag{ Where is $x$} \\
x + y &= z \\
x + y &= z \\
```

$x + y = z$
 $x + y = z$ Where is x
 $x + y = z$
 $x + y = z$

```
x + y &= z \\
x + y &= z \quad \mbox{ Where is $x$} \\
x + y &= z \\
x + y &= z \\
```

9 Math mode inside verbatim

abc α, β, ϕ

The limit of function

$$\lim_{h \rightarrow 0} \frac{f(x + h) - f(x)}{h}$$

```
\usepackage{alltt}
\begin{alltt}
The limit of function \(\ \lim_{h \to 0} \frac{f(x + h) - f(x)}{h} \)
\end{alltt}
```

10 Set

\emptyset \cap \cup $|$
 $\{1, 2, 3, \dots\}$
 $\{x \mid x < 3 \text{ and } x > 10\}$
 $\mathcal{A} = \cup(U_\alpha, \phi_\alpha)$

```
$\emptyset$ \quad $\cap$ \quad $\cup$ \quad $\mid$ $\backslash$ $\backslash$  
$\{1, 2, 3, \dots\}$ $\backslash$ $\backslash$  
$\{x \mid x < 3 \text{ and } x > 10\}$ $\backslash$ $\backslash$  
$\mathcal{A} = \cup(U_{\alpha}, \phi_{\alpha})$
```

- C++
- Java
- Haskell

```
\begin{itemize}  
\item C++  
\item Java  
\item Haskell  
\end{itemize}
```

1. C++
2. Java
3. Haskell

```
\begin{enumerate}  
\item C++  
\item Java  
\item Haskell  
\end{enumerate}
```

11 Sphere Parametric Equation

$$\begin{aligned}x &= r \sin \alpha \cos \theta \\y &= r \sin \alpha \\z &= r \cos \alpha \sin \theta\end{aligned}$$

(1)

```
\begin{equation}  
\begin{aligned}  
x &= r \sin \alpha \cos \theta \\y &= r \sin \alpha \\z &= r \cos \alpha \sin \theta \\\end{aligned}  
\end{equation}
```

12 Equataion Cases

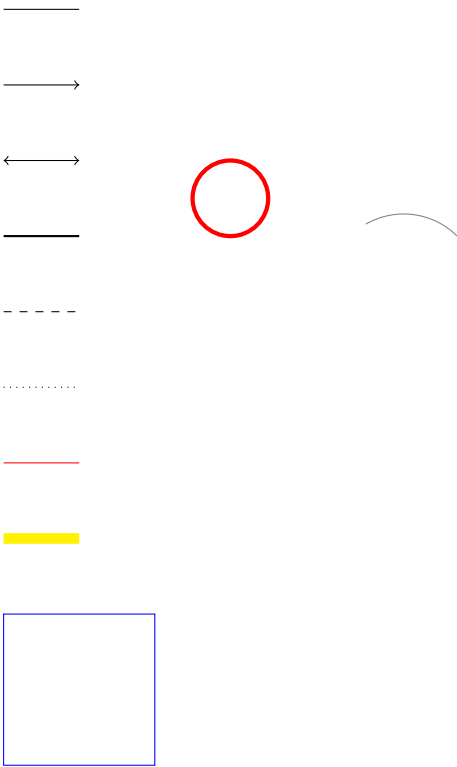
$$f(\alpha,\theta)=\begin{cases} x(\alpha,\theta)=r\sin\alpha\cos\theta \\ y(\alpha,\theta)=r\sin\alpha \\ z(\alpha,\theta)=r\cos\alpha\sin\theta \end{cases}$$

(2)

```
\begin{equation}
\begin{aligned}
\begin{cases}
x(\alpha,\theta)=r\sin\alpha\cos\theta\\
y(\alpha,\theta)=r\sin\alpha\\
z(\alpha,\theta)=r\cos\alpha\sin\theta
\end{cases}
\end{aligned}
\end{equation}
```

13 Tikz Example

Draw Line



```
\draw      (0,3,0) -- (1,3,0);
\draw [->]  (0,2,0) -- (1,2,0);
\draw [<->] (0,1,0) -- (1,1,0);
\draw [thick] (0,0,0) -- (1,0,0);
\draw [dashed] (0,-1,0) -- (1,-1,0);
\draw [dotted] (0,-2,0) -- (1,-2,0);
\draw [red]    (0,-3,0) -- (1,-3,0);
\draw [yellow, line width=4] (0,-4,0) -- (1,-4,0);
\draw [blue] (0, -5) rectangle (2, -7);
\draw [red, ultra thick] (3,0.5) circle [radius=0.5];
\draw [gray] (6,0) arc [radius=1, start angle=45, end angle= 120];
```

14 Cartesian Coordinates System

```
\begin{tikzpicture}[->]
\draw (0,0,0) -- (1,0,0);
```

```
\draw (0,0,0) -- (0,1,0);  
\draw (0,0,0) -- (0,0,1);  
\end{tikzpicture}
```