LaTeX

Mathematics (2)

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Outlines

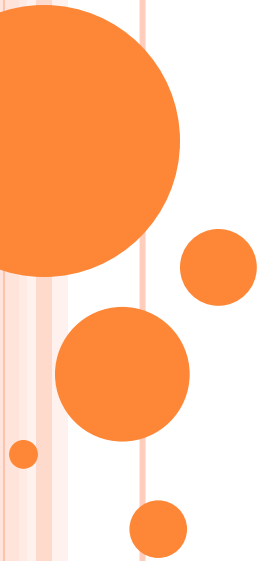
1 Piecewise Functions

2 Numbering Equations

3 Aligning Equations

4 Matrices

5 Complex Formula Examples



Piecewise Functions

```
\begin{equation}
g(x)=
\begin{cases}
2x, & x<-100\\
6x^3, & -100<x<200\\
34x^6+12, & 200\leq x \leq 500\\
\cosh^5x, & x\geq700
\end{cases}
\end{equation}
```

$$g(x) = \begin{cases} 2x, & x < -100 \\ 6x^3, & -100 < x < 200 \\ 34x^6 + 12, & 200 \leq x \leq 500 \\ \cosh^5 x, & x \geq 700 \end{cases}$$

Numbering equations

```
\begin{align}
(x+y)^3  &=(x+y)(x+y)(x+y) \\
&=(x+y)(x^2+xy+yx+y^2) \\
&=x^3+3x^2y+3xy^2+y^3  \notag
\end{align}
```

$$
\begin{aligned}
(x+y)^3 &= (x+y)(x+y)(x+y) && (1)\\
&= (x+y)(x^2+xy+yx+y^2) && (2)\\
&= x^3+3x^2y+3xy^2+y^3
\end{aligned}
$$

Numbering equations

```
\begin{align}
f(x) &=x^2+x & g(x)&=\sin^2x\\
f`(x)&=2x+1 & g'(x)&= 2\sin x\cos x
\end{align}
```

$$f(x) = x^2 + x \qquad g(x) = \sin^2 x \tag{3}$$

$$f`(x) = 2x + 1 \qquad g'(x) = 2\sin x \cos x \tag{4}$$

Numbering equations

```
\begin{align*}
f(x)  &=x(x+1)  \\
&=x^2+x
\end{align*}
```

$$
\begin{aligned}
f(x) &= x(x+1) \\
&= x^2 + x
\end{aligned}
$$

Numbering equations

```
\begin{align*}
(x+y)^2&=x^2+xy+yx+y^2\\
\intertext{and we have}
 &=x^2+2xy+y^2
\end{align*}
```

$$(x+y)^2 = x^2+xy+yx+y^2$$

and we have

$$= x^2+2xy+y^2$$

Numbering equations

```
\begin{equation}
\label{eq1}
\begin{split}
A &= \frac{\pi r^2}{2} \\
  &= \frac{1}{2} \pi r^2
\end{split}
\end{equation}
```

$$\begin{aligned} A &= \frac{\pi r^2}{2} \\ &= \frac{1}{2}\pi r^2 \end{aligned} \tag{1}$$

Numbering equations

```
\documentclass{article}
\usepackage{amsmath}

\begin{document}
Example 1 :
\begin{align}
\begin{split}
f(x) &= x^2 , \\
g(x) &= \exp( x ) .
\end{split}
\end{align}

Another example:
\begin{equation}
\begin{aligned}
dr_t &= x^3, \\
dp_t &= \mu(x), \\
f(y) &= \sin(x^2)
\end{aligned}
\end{equation}

\end{document}
```

Example 1 :

$$\begin{aligned} f(x) &= x^2, \\ g(x) &= \exp(x). \end{aligned} \tag{1}$$

Another example:

$$\begin{aligned} dr_t &= x^3, \\ dp_t &= \mu(x), \\ f(y) &= \sin(x^2) \end{aligned} \tag{2}$$

Numbering equations

```
\documentclass{article}
\usepackage{amsmath}

\numberwithin{equation}{section}
\begin{document}

\section{Here is a section}
\begin{equation}
   f(x)=x^2
\end{equation}

\section{Here is Next section}
\begin{equation}
   f(x)=x^2+\sin(x)^2
\end{equation}
\begin{equation}
   f(x)=\sin(x)
\end{equation}

\end{document}
```

1 Here is a section

$$f(x) = x^2 \tag{1.1}$$

2 Here is Next section

$$f(x) = x^2 + \sin(x)^2 \tag{2.1}$$

$$f(x) = \sin(x) \tag{2.2}$$

Numbering equations

```
\numberwithin{equation}{subsection}
\begin{document}

\section{Here is a section}
\subsection{A subsection}
\begin{equation}
f(x)=x^2
\end{equation}
\section{Here is Next section}
\subsection{A subsection}
\subsection{Other subsection}
\begin{equation}
f(x)=x^2+\sin(x)^2
\end{equation}
\begin{equation}
f(x)=\sin(x)
\end{equation}

\end{document}
```

1 Here is a section

1.1 A subsection

$$f(x) = x^2 \tag{1.1.1}$$

2 Here is Next section

2.1 A subsection

2.2 Other subsection

$$f(x) = x^2 + \sin(x)^2 \tag{2.2.1}$$

$$f(x) = \sin(x) \tag{2.2.2}$$

Matrices

```
\documentclass{article}
\usepackage{amsmath}

\begin{document}

\begin{equation}
\begin{vmatrix}
1 & \sin x & 24 \\
a^2 & 4 & 2
\end{vmatrix}
\end{equation}

\end{document}
```

$$\begin{vmatrix} 1 & \sin x & 24 \\ a^2 & 4 & 2 \end{vmatrix}$$

Matrices

```
\documentclass{article}
\usepackage{amsmath}
\begin{document}
\[
\resizebox{0.9\textwidth}{!}{\mbox{\ensuremath{\displaystyle
M=
\begin{pmatrix}
11 & 12 \\
21 & 22
\end{pmatrix}
}}}
\]
\end{document}
```

$$M = \begin{pmatrix} 11 & 12 \\ 21 & 22 \end{pmatrix}$$

Matrices

```
$$ H = \left [
\begin{array}{*{25}{c}}
1&1&1&1&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0 \\
0&0&0&0&0&1&1&1&1&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0 \\
 0&0&0&0&0&0&0&0&0&0&1&1&1&1&1&0&0&0&0&0&0&0&0&0&0 \\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&1&1&1&1&0&0&0&0&0 \\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&1&1&1&1 \\
1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0 \\
0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0 \\
0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0 \\
0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0 \\
0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1
\end{array}
\right ] $$
```

$$H = \left[\begin{array}{*{25}{c}}
1&1&1&1&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0 \\
0&0&0&0&0&1&1&1&1&1&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0 \\
0&0&0&0&0&0&0&0&0&0&1&1&1&1&1&0&0&0&0&0&0&0&0&0&0 \\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&1&1&1&1&0&0&0&0&0 \\
0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&0&1&1&1&1&1 \\
1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0 \\
0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0 \\
0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0 \\
0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0 \\
0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1&0&0&0&0&1
\end{array} \right]$$

Matrices

```
\[
\left \{
\begin{tabular}{ccc}
        1 & 5 & 8 \\
        0 & 2 & 4 \\
        3 & 3 & -8
\end{tabular}
\right \}
\]
```

$$\left\{ \begin{array}{ccc} 1 & 5 & 8 \\ 0 & 2 & 4 \\ 3 & 3 & -8 \end{array} \right\}$$

Complex Formula Examples

```
\begin{equation}
\frac{\sum_{n>0} z^n}
{\prod_{1 \leq  k  \leq n} (1-q^k)}
\end{equation}
```

$$\frac{\sum_{n>0} z^n}{\prod_{1\leq k\leq n}(1-q^k)} \tag{1}$$

Complex Formula Examples

```
\begin{equation}
\frac{{\displaystyle\sum_{n>0} z^n}}
{{\displaystyle\prod_{1\leq k  \leq n} (1-q^k)}}
\end{equation}
```

$$\frac{\displaystyle\sum_{n>0} z^n}{\displaystyle\prod_{1\leq k \leq n} (1-q^k)} \tag{2}$$

Complex Formula Examples

```
\begin{equation}
\frac{{\displaystyle\sum_{n>0} z^n}}
{{\displaystyle\prod\nolimits_{1 \leq  k  \leq n} (1-q^k)}}
\end{equation}
```

$$\frac{\displaystyle\sum_{n>0} z^n}{\displaystyle\prod\nolimits_{1 \leq k \leq n} (1-q^k)} \tag{3}$$

Complex Formula Examples

```
\begin{equation}
\sum_{\substack{0\le i\le m\\ 0<j<n}} p(i,j)
\end{equation}
```

$$\sum_{\substack{0\le i\le m\\ 0<j<n}} p(i,j) \tag{4}$$

Complex Formula Examples

```
\begin{equation}
\cfrac{1}{\sqrt{2}+
\cfrac{1}{\sqrt{2}+
\cfrac{1}{\sqrt{2}+\cdots}}}
\end{equation}
```

$$\cfrac{1}{\sqrt{2}+\cfrac{1}{\sqrt{2}+\cfrac{1}{\sqrt{2}+\cdots}}} \tag{5}$$

Complex Formula Examples

```
\begin{equation}

\boxed{\Re{z}=\frac{n\pi\frac{\theta+\psi}{2}}

{\left(\frac{\theta+\psi}{2}\right)^2+

\left(\frac{1}{2}log\arrowvert\frac{B}{A}\arrowvert\right)^2}}

\end{equation}
```

$$\boxed{\Re z = \frac{n\pi\frac{\theta+\psi}{2}}{\left(\frac{\theta+\psi}{2}\right)^2+\left(\frac{1}{2}log|\frac{B}{A}|\right)^2}} \tag{6}$$

Complex Formula Examples

```
\begin{equation}
\sum_{n=1}^{\infty}
\sum_{p=1}^{\infty}
\frac{\sqrt[3]{2}}{6p^3n}
\end{equation}
```

$$\sum_{n=1}^{\infty}\sum_{p=1}^{\infty}\frac{\sqrt[3]{2}}{6p^3n} \tag{7}$$

Complex Formula Examples

```
\begin{equation}
\sideset{_{xy}^{xz}}{_*^*}\prod
\end{equation}
```

$$\sideset{_{xy}^{xz}}{_*^*}\prod \tag{8}$$

The END

Thank you!