LaTeX grammer

Operators

1. Binary Operator

LaTeX grammer	Symbol	Explanation
`\cdot`	$\cdot$	inner product
`\times`	$\times$	cross product
`\pm`	$\pm$	plus minus
`\circ`	$\circ$	circle
`\circledast`	$\circledast$	convolution
`\odot`	$\odot$	
`\oplus`	$\oplus$	direct sum
`\otimes`	$\otimes$	tensor, product measure spaces

2. Calculus

LaTeX grammer	Symbol	Explanation
`\partial`	∂	partial derivative
`\nabla`	∇	nabla
`\Delta`	Δ	capital delta
`\int`	$\int$	integral

Relation Symbols

LaTeX grammer	Symbol	Explanation
`\neq`	$\neq$	not equal
`\geq`	$\geq$	greater than or equal to
`\leq`	$\leq$	less than or equal to
`\sim`	$\sim$	similiar
`\simeq`	$\simeq$	asymptotic
`\approx`	$\approx$	approximate
`\propto`	$\propto$	proportional

Arrows

LaTeX grammer	Symbol	Explanation
`\rightarrow`	$\rightarrow$	right arrow
`\leftarrow`	$\leftarrow$	left arrow
`\uparrow`	$\uparrow$	up arrow
`\downarrow`	$\downarrow$	down arrow
`\leftrightarrow`	$\leftrightarrow$	bidirectional arrow
`\Leftrightarrow`	$\Leftrightarrow$	bidirectional thick arrow

Set Operations

LaTeX grammer	Symbol	Explanation
`\cup`	$\cup$	union
`\cap`	$\cap$	intersection
`\in`	$\in$	element
`\notin`	$\notin$	not element
`\ni`	$\ni$	element
`\subset`	$\subset$	subset
`\subseteq`	$\subseteq$	subset
`\supset`	$\supset$	subset
`\supseteq`	$\supseteq$	subset

Complements

LaTeX grammer	Symbol	Explanation
`\dfrac{}{}`	$\dfrac{a}{b}$	always shows fraction in display mode
`\tfrac{}{}`	$\tfrac{a}{b}$	always shows fraction in type mode

Spacing

```
$local minimum$ (no spacing)
$local\, minimum$ (one spacing)
$local\; minimum$ (two spacing)
$local\quad minimum$ (four spacing)
```

$localminimum$ (no spacing)
$local\,minimum$ (one spacing)

local minimum (two spacing)
local *minimum* (four spacing)

Fractions

`\over`

Things at the left of `\over` will be the numerator, and right will be the denominator.

`$s^2+2s+s\over s+\sqrt s+1$`

$$\frac{s^2+2s+s}{s+\sqrt{s}+1}$$

`\frac`

Things at the first braket will be the numerator, and second will be the denominator.

`$\frac{1+s}{s(s+2)}$`

$$\frac{1+s}{s(s+2)}$$

Matrices

We use `matrix` symbol, using `&` for columns and `\\` for rows.

```
$$
\begin{gather}
\begin{matrix}1&2\\3&4\\ \end{matrix}\\
\begin{pmatrix}1&2\\3&4\\ \end{pmatrix}\\
\begin{bmatrix}1&2\\3&4\\ \end{bmatrix}\\
\begin{Bmatrix}1&2\\3&4\\ \end{Bmatrix}\\
\begin{vmatrix}1&2\\3&4\\ \end{vmatrix}\\
\begin{Vmatrix}1&2\\3&4\\ \end{Vmatrix}
\end{gather}
$$
```

$$\begin{gather}
\begin{matrix}1&2\\3&4\\ \end{matrix}\\
\begin{pmatrix}1&2\\3&4\\ \end{pmatrix}\\
\begin{bmatrix}1&2\\3&4\\ \end{bmatrix}\\
\begin{Bmatrix}1&2\\3&4\\ \end{Bmatrix}\\
\begin{vmatrix}1&2\\3&4\\ \end{vmatrix}\\
\begin{Vmatrix}1&2\\3&4\\ \end{Vmatrix}
\end{gather}$$

Norms

We use `\vert` and `\left\lvert`, `\right\rvert` for norm characters.

```
$$\vert x \vert$$
$$\left\lvert \frac{s^2+1}{s^3+2s^2+3s+1} \right\rvert$$
```

$$|x|$$

$$\left|\frac{s^2+1}{s^3+2s^2+3s+1}\right|$$

Cases (piecewise functions)

We use `cases` symbol.

```
$$\vert x\vert=
\begin{cases}
-x,\;if\;x<0\\
+x,\;if\;x\geq0
\end{cases}$$
```

$$|x| = \begin{cases} -x,\ if\ x < 0 \\ +x,\ if\ x \geq 0 \end{cases}$$

Font Type

`$\mathcal{ABCDEFGHIJKLMNOPQRSTUVWXYZ}$`
$\mathcal{ABCDEFGHIJKLMNOPQRSTUVWXYZ}$
`$\mathbb{ABCDEFGHIJKLMNOPQRSTUVWXYZ}$`
$\mathbb{ABCDEFGHIJKLMNOPQRSTUVWXYZ}$

How to align about certain character

We use `aligned` symbol for it. Things will be aligned about `&character`.

```
$$
\begin{aligned}
f(x)&=ax^2 + bx + c\\
g(x)&=ax^4
\end{aligned}
$$
```

$$\begin{aligned} f(x)&=ax^2 + bx + c\\ g(x)&=ax^4 \end{aligned}$$

How to use Roman font

We use `\textrm{}`. We can use `{\rm}`, too.

```
$$\displaystyle\int f\, d\mu =\sup\{\mathcal L(f, P) : P\textrm{ is an }\mathcal S
\textrm{-partition of X}\}.$$
```

$$\displaystyle\int f\, d\mu =\sup\{\mathcal L(f, P) : P\textrm{ is an }\mathcal S\textrm{-partition of X}\}.$$

```
$$
\dfrac{{\rm d}y}{{\rm d}x}
$$
```

$$\dfrac{{\rm d}y}{{\rm d}x}$$