MY ARTICLE

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1. Introduction

A good introduction to fractal geometry is Falconer [1]. There is `smallmatrix` environment (e.g, $\left(\begin{smallmatrix} a & b \\ c & d \end{smallmatrix}\right)$). It is recommended to use $\dots, \cdots, \cdots, \cdots, \dots$ instead of $\dots$ and $\cdots$. Then we test the `\nobreakdash`: p-adic, page 1–9, n-dim, 1-dim, σ-algebra. What about a text-mode fractional: $\frac{\log_k H}{1212}$.

Then for the `\xleftarrow`:

$$A \xleftarrow{n+\mu-1} B \xrightarrow[T]{n\pm i-1\text{bla, bla, bla}} C \bigcap_{i\geq 1} A_i \bigcup_{k=1}^{100} \Upsilon_k \tag{1.1}$$

$$\Leftrightarrow$$

Compare the `\choose` and `\binom` : $\binom{n}{k}\binom{n}{k}$. $|z|, \|v\|, \|v\|_\infty$.

About the user-defined math operators:

$$\mathrm{ex}(\mathrm{conv}(A_i)) \operatorname*{abc}_{x\to 0} \operatorname*{Lim}_{n\to\infty}$$

Then the `mod`: $\gcd(n, m \bmod n); \quad x \equiv y \pmod b, x \equiv y \mod c, x \equiv y \pod d$.

See the following default math environments:

$$\vec{F} = m\vec{a} \tag{1.2}$$

$$\vec{F} = G\frac{m_1 m_2}{r^2}$$

$$\nabla \cdot \vec{E} = \varepsilon_0 \rho \tag{1.3a}$$
$$\nabla \cdot \vec{B} = 0 \tag{1.3b}$$
$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t} \tag{1.3c}$$
$$\nabla \times \vec{B} = \mu_0 \varepsilon_0 \vec{J} + \frac{\partial \vec{E}}{\partial t} \tag{1.3d}$$

$$\begin{gathered} E = \gamma m c^2 \\ \mathcal{R}_{\mu\nu} - \frac{\mathcal{R}}{2} g_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu} \end{gathered} \tag{1.4}$$

- `\substack{}` and `\begin{subarray}`

$$\operatorname*{Lim}_{\substack{0\le i\le m\\ 0<j<n}} P(i,j) \tag{1.5}$$

$$\sum_{\begin{subarray}{l} i\in\Lambda \\ 0<j<n \end{subarray}} P(i,j) \tag{1.6}$$

♡ `\sideset{text}{right}{symbol}`

$$a_0 + \cfrac{1}{a_1 + \cfrac{1}{a_2 + \cfrac{1}{a_3 + \cdots}}}$$

$$\sideset{_*^*}{_*^*}\prod_{n=1}^{\infty} \left[\sideset{_*^*}{_*^{*\infty}}\prod_{n=1} \quad \sum_{\text{ex}} \quad \prod_{n=1}^{\infty} \lim_{n\to\infty} \right] \Bigg\} \lim_{n\to\infty} \text{Quantum Computing} \tag{1.7}$$

The `\mathbf` command is commonly used to obtain bold Latin letters in math, but for most other kinds of math symbols it has no effect.

`\mid` and `\mathbin{}` :$P(A \mid B) P(A \mathbin{|} B) P(A|B)$

(a) `f : X\to Y` vs. `f\colon X\to Y`: $f : X \to Y$ vs. $f\colon X \to Y$.
(b) `:=` vs. `\colonequals` : $:=$ vs. $\coloneqq$.
(c) $\{z : z \in \mathbb{Z}\}$ vs. $\{z\colon z \in \mathbb{Z}\}$.
(d) $v_1, v_2, \ldots, v_n$ vs. $v_1, \ldots, v_n$.

(e) $f(n) = O(n)$ vs. $f(n)$ is $O(n)$ or $f(n) \in O(n)$.
(f) $A \setminus B$ vs. $A\backslash B$ vs. $A - B$.
(g) There is a `\,` spacing between integrand and measure

$$\int_a^b x^2 \, dx$$

(h) Use `text`

Here is some practical suggestions for mathematical writting.

(1) The structures for conditional sentences: `If` . . . `, then`. . . ; `When`. . . , . . . ; `For` . . . , ... No `Let`. . . . `Then`. . . !
(2) Avoid using `as` and `for` to introduce reasons after some conclusion.
(3) `Hence`, `Thus`, and `Therefore,` .
(4) `, so` is informal and should be used when the conclusion is short.
(5) A statement that is `assumed` is an axiom, and throughout to be true. Something `supposed` is a hypothesis and more appropriate to introduce a case or an argument by contradition. For example, `Suppose to the contrary that` and `Toward a contradiction, suppose that`.
(6) No v`'s` or a_i`'s`.
(7) No *nested* proof environments.
(8) `We induct on n` vs. `We use induction on n`.
(9) Prefer `pairwise` to `mutually`.
(10) No contractions like `can't`, `won't`, etc.
(11) Use `\begingroup\allowdisplaybreaks ... \endgroup` to allow the large chunk of math display environments to be broken into pages.
(12) Replace `$$ ... $$` with `\[...\]` in `sed`:

```
sed '/\$\$/{:x;N;/.*\$\$ *$/!bx;s/\$\$\(.*\)\$\$ *$/\\[\1\\]/}'
```

2. Commutative diagrams

Arrows `@>>> @<<< @VVV @AAA`. Double lines: `@=`. Null arrows: `@`

$$\begin{CD} S^{\mathcal{W}_\Lambda \otimes T} @>j>> T \\ @| @VV{\operatorname{End} P}V \\ (S \otimes T)/I @= (Z \otimes T)/J \end{CD} \tag{2.1}$$

`tikzcd` is the ultimate answer to a commutative diagram in TeX.

$$\begin{tikzcd} A \arrow[r, "\phi"] \arrow[dr] & B \\ & C \end{tikzcd}$$

References

[1] K. J. Falconer. *Fractal geometry : mathematical foundations and applications.* Wiley, Chichester, 2003. 1

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