

MY ARTICLE

ZHOU FENG

1. INTRODUCTION

A good introduction to fractal geometry is Falconer [1]. There is `smallmatrix` environment (e.g, $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$). 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`:

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

\Leftrightarrow

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

About the user-defined math operators:

$$\text{ex}(\text{conv}(A_i)) \text{abc} \lim_{x\rightarrow 0 \ n\rightarrow \infty}$$

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

See the following default math environments:

$$(1.2) \quad \vec{F} = m\vec{a}$$

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

$$(1.3a) \qquad \nabla \cdot \vec{E} = \varepsilon_0 \rho$$

$$(1.3b) \qquad \nabla \cdot \vec{B} = 0$$

$$(1.3c) \qquad \nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$$

$$(1.3d) \qquad \nabla \times \vec{B} = \mu_0 \varepsilon_0 \vec{J} + \frac{\partial \vec{E}}{\partial t}$$

$$(1.4) \qquad \qquad \qquad E = \gamma mc^2$$

$$\mathcal{R}_{\mu\nu} - \frac{\mathcal{R}}{2} g_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}$$

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

$$(1.5) \qquad \lim_{\substack{0 \leq i \leq m \\ 0 < j < n}} P(i, j)$$

$$(1.6) \qquad \sum_{\substack{i \in \Lambda \\ 0 < j < n}} P(i, j)$$

♡ `\sideset{text}{right}{symbol}`

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

$$(1.7) \qquad \prod_{n=1}^{\infty} \left[\prod_{n=1}^{*\infty} \sum_{\text{ex}} \prod_{n=1}^{\infty} \right] \bigg\} \lim_{n \rightarrow \infty} \text{Quantum Computing}$$

The `\mathbf{f}` 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{}` : $P(A \mid B)P(A \mid B)P(A|B)$

(a) `f : X\to Y` vs. `f\colon X\to Y`: $f : X \rightarrow Y$ vs. $f : X \rightarrow Y$.

(b) `:=` vs. `\colonequals` : $:=$ vs. $:=$.

(c) $\{z : z \in \mathbb{Z}\}$ vs. $\{z : z \in \mathbb{Z}\}$.

(d) v_1, v_2, \dots, v_n vs. v_1, \dots, 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 \setminus , 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 contradiction. 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: `@`

$$(2.1) \quad \begin{array}{ccc} S^{\mathcal{W}_\Lambda \otimes T} & \xrightarrow{j} & T \\ \parallel & & \downarrow_{\text{End } P} \\ (S \otimes T)/I & \equiv & (Z \otimes T)/J \end{array}$$

`tikzcd` is the ultimate answer to a commutative diagram in $\text{T}_{\text{E}}\text{X}$.

$$\begin{array}{ccc} A & \xrightarrow{\phi} & B \\ & \searrow & \\ & & C \end{array}$$

REFERENCES

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

DEPARTMENT OF MATHEMATICS, THE CHINESE UNIVERSITY OF HONG KONG, SHATIN, HONG KONG

Email address: `zfeng@math.cuhk.edu.hk`