MY ARTICLE

ZHOU FENG

1. Introduction

A good introduction to fractal geometry is Falconer [3]. There is `smallmatrix` environment (e.g, $\left(\begin{smallmatrix} a & b \\ c & d \end{smallmatrix}\right)$). It is recommended to use $\ldots, \cdots, \cdots, \cdots, \ldots$ instead of $\ldots$ 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`:

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

$$\Leftrightarrows$$

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

About the user-defined math operators:

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

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

See the following default math environments:

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

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

$$\nabla \cdot \vec{E} = \varepsilon_0 \rho \tag{1.3a}$$

$$\nabla \cdot \vec{B} = 0 \tag{1.3b}$$

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

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

$$E = \gamma m c^2$$

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

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

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

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

♡ `\sideset{text}{right}{symbol}`

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

$$\left.\begin{matrix} {}^{*}\prod_{n=1}^{\infty} & \left[\begin{matrix} {}^{*}\prod_{*n=1}^{*\infty} & \sum & \prod_{n=1}^{\infty} \\ {}_{*}\prod_{*} & \text{ex} & \lim_{n\to\infty} \end{matrix}\right] \end{matrix}\right\} \lim_{n\to\infty} \text{Quantum Computing} \tag{1.7}$$

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

(a) `f : X\to Y` vs. `f\colon X\to Y`: $f : X \to Y$ vs. $f\colon X \to Y$.
(b) `:=` vs. `\coloneqq` : $:=$ 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 `Serre et al.\ proved`: Serre et al. proved.
`Serre et al. proved`: Serre et al. proved.
(i) $\boxed{\text{text box}}$ & $\boxed{\text{math box } \boxed{\mathbb{R}}}$.
(j) `\vv{AB}` $\vv{AB}$ vs. `\overrightarrow{AB}` $\overrightarrow{AB}$
(k) `if...` statements:
- `\ifnum\value{num}>n {A} \else {B}\fi`: A
- `\ifodd\value{num} {A}\else {B}\fi`: B
- `\ifthenelse{\(\NOT 4<2 \OR 4>11\)\AND\isodd{4}}{A}{B}`: B

(l) `loops`:
- `@for`: The sun is rising. The sun is setting.
- `@whilenum`: 1 Δ 3 Λ 5 Π 7 ϒ 9 Ψ 11 ff 13 fl 15 ffl 17 ȷ 19 ´
- `\loop...\repeat`: 1 † 2 ‡ 3 § 4 ¶ 5 ‖ 6 ∗∗ 7 †† 8 ‡‡

Soft page break with `\pagebreak`

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\\]/}'
```
(13) Use `\emph{}` over `\textit{}`
(14) More built-in letters. Hebrew letters: $\aleph\beth\gimel$; Others: $\nabla\wp\hbar\imath\jmath$

2. Commutative diagrams

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

$$\begin{array}{ccc} S^{\mathcal{W}_\Lambda \otimes T} & \xrightarrow{j} & T \\ \| & & \downarrow{\scriptstyle \operatorname{End} P} \\ (S \otimes T)/I & = & (Z \otimes T)/J \end{array} \tag{2.1}$$

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

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

Hard page break with `\newpage`

3. REFERENCE & CITATION

Choose a `natbib` compatible `\bibliographystyle`, e.g. `abbrvnat`, `plainnat`.

- `\cite{}`: [1]
- `\citet{}`: Akiyama et al. [1]
- `\citet*{}`: Akiyama, Feng, Kempton, and Persson [1]
- `\citep{}`: [1]
- `\citep*{}`: [1]
- `\citealt*{}`: Akiyama, Feng, Kempton, and Persson 1
- `\citeyear{}`: 2020
- `\citeauthor{}`: Akiyama et al.
- `\citeauthor*{}`: Akiyama, Feng, Kempton, and Persson
- `\cite[text]{keylist}` [1, Theorem 1]
- `\cite[prefix][suffix]{keylist}`: [see e.g. 1, p. 123]
- `\citenum{}`: 1
- `\citeyearpar{}`: [2020]
- `\citefullauthor{}`: Akiyama, Feng, Kempton, and Persson

See also a book Parry [6] and an arXiv preprint [5]. More multi-authors citation like Benoist and Quint [2] and Fan, Lau, and Rao [4].

Remark 3.1. For the use of `natbib` and format of arXiv preprint, it is recommended to use the `.bst` files `*nat.bst` or `*natDOI.bst` at

https://github.com/zfengg/toolkit/tree/master/tex/bst.

Otherwise, all the other default `bst` styles suffices.

REFERENCES

[1] S. Akiyama, D.-J. Feng, T. Kempton, and T. Persson. On the Hausdorff dimension of Bernoulli convolutions. *Int. Math. Res. Not. IMRN*, (19):6569–6595, 2020. 4

[2] Y. Benoist and J.-F. Quint. *Random walks on reductive groups*, volume 62 of *Ergebnisse der Mathematik und ihrer Grenzgebiete. 3. Folge. A Series of Modern Surveys in Mathematics [Results in Mathematics and Related Areas. 3rd Series. A Series of Modern Surveys in Mathematics]*. Springer, Cham, 2016. 4

[3] K. Falconer. *Fractal geometry*. John Wiley & Sons, Inc., Hoboken, NJ, second edition, 2003. Mathematical foundations and applications. 1

[4] A.-H. Fan, K.-S. Lau, and H. Rao. Relationships between different dimensions of a measure. *Monatsh. Math.*, 135(3):191–201, 2002. 4

[5] D.-J. Feng. Dimension of invariant measures for affine iterated function systems. *arXiv preprint arXiv:1901.01691*, 2020. 4

[6] W. Parry. *Topics in ergodic theory*, volume 75 of *Cambridge Tracts in Mathematics*. Cambridge University Press, Cambridge-New York, 1981. 4

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

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