1. Prime numbers

Definition 1.1: hi hi A natural number $N \in \mathbb{N}$ is called a prime number if it is greater than 1 and cannot be written as the product of two smaller natural numbers.

Example: The numbers 2, 3, and 17 are prime. Corollary 1.2.1 shows that this list is not exhaustive!

Theorem 1.1 (233): 233 theorem

Theorem 1.2 (Euclid): There are infinitely many primes.

Proof: Suppose to the contrary that $p_1, p_2, ..., p_n$ is a finite enumeration of all primes. Set $P = p_1 p_2 ... p_n$. Since $P + 1$ is not in our list, it cannot be prime. Thus, some prime factor p_j divides $P + 1$. Since p_j also divides P, it must divide the difference $(P + 1) - P = 1$, a contradiction. □

Corollary 1.2.1: There is no largest prime number.

Corollary 1.2.2: There are infinitely many composite numbers.

Theorem 1.3: There are arbitrarily long stretches of composite numbers.

Proof: For any $n > 2$, consider

$$n! + 2, \quad n! + 3, \quad ..., \quad n! + n$$

□

2. Logic

2.1. Notaion

- Proposition P, Q, R
- Logical Connectives $\neg \vee \wedge \Rightarrow \Leftrightarrow$
- Logical Equivalence $\equiv$

中文可用性???
中文原生支持 这点就比 LaTeX 强太多了
而且没有更加扁平化 没有那么多的嵌套反斜杠和花括号
换行也强!!!

2.2. Operation

2.3. Set List Notation (Informal)

$S = \{a, b, c, ...\}$

2.4. Set Builder Notation

$S = \{x : P(x)\}$

3. Empty Set

If there not exist such x satisifies $P(x)$, then it would be an empty set $\emptyset$

4. Set Inclusion

$A \subseteq B$ means $\forall x \in A, x \in B$

4.1. Property of Set Inclusion

- Reflextivity: $A \subseteq A$
- Antisymmetry: $A \subseteq B \wedge B \subseteq A \Leftrightarrow A = B$
- Transitivity: $A \subseteq B \wedge B$ sub $C \Rightarrow A \subseteq C$

5. Set Union and Intersection

$A \cup B = \{x : x \in A \vee x \in B\}$
$A \cap B = \{x : x \in A \wedge x \in B\}$

$A \cup B = \{x : x \in A \vee x \in B\}$

6. Set Family Union and Intersection

$\cup \mathcal{A} = \{x : \exists x \in A, A \in \mathcal{A}\}$

$\cap \mathcal{A} = \{x : \forall x \in A, A \in \mathcal{A}\}$

Corollary 1.2.1

7. Auto Number Headings

7.1. Subsection

7.1.1. subsubsection

- headings
- headings
- good
  - sub
  - sd
  - sd
    - asd
      - asd
- sad

```
console.log("Hello")
```