Some $\LaTeX$Examples

D. Seabold

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Common symbols: $\in \notin \subset \subseteq \not\subseteq \cup \cap \bigcup \bigcap \times \mid \equiv \not\equiv \vee \wedge \implies \iff \longrightarrow \circ$

1. Given any two real numbers x and y with $x < y$, there is a real number z such that $x < z < y$.
2. If $a, b \in \mathbb{N}$ and $b \neq 0$, then $\frac{a}{b} \in \mathbb{Q}$.
3. My fraction doesn't have to be cramped $(\frac{x^3-3x+1}{x^2-2})$. It can look like $\left(\dfrac{x^3-3x+1}{x^2-2}\right)$ instead. Check out the code for the large parentheses.
4. For every $x \in \mathbb{R}$,
   - $x < 0$,
   - $x = 0$, or
   - $x > 0$.
5. For every $x \in \mathbb{R}$,
   (a) $x < 0$,
   (b) $x = 0$, or
   (c) $x > 0$.
6. For any two sets A and B

$$\overline{A \cup B} = \overline{A} \cap \overline{B}.$$

7. I can also typeset that like this:

$$\overline{A \cup B} = \overline{A} \cap \overline{B}$$

8. Suppose A_1, A_2, A_3, are sets. Distinguish between the union of two sets

$$A_1 \cup A_2$$

and the union of infinitely many sets:

$$\bigcup_{i=1}^{\infty} A_i.$$

9. Suppose that $A \subseteq B$. Then if $x \notin B$, it follows that $x \notin A$.

10. If $f : \mathbb{R} \longrightarrow \mathbb{R}$ is differentiable, then it is continuous.

11. If both $f : A \longrightarrow B$ and $g : B \longrightarrow C$ are bijections, then their composition $g \circ f$ and the inverse f^{-1} are bijections as well.

12. If $n \equiv 3 \pmod 4$ then $n^2 \equiv 1 \pmod 4$. Of course, this implies that $n^2 \not\equiv 2 \pmod 4$.

13. If n is a prime number and $n \mid ab$ then either $n \mid a$ or $n \mid b$. Hence if $n \nmid a$ then $n \mid b$.

14. Two sets, A and B, are said to be *disjoint* if

$$A \cap B = \emptyset.$$

15. If $0 \leq a \leq b$ then $a^2 \leq b^2$.

16. Let $S = \{n \in \mathbb{Z} : n^2 + 3n - 1 \geq 0\}$.

17. Let $T = \{2, 4, 8, 16, \ldots, 1024\}$.

18. For every $\epsilon > 0$ there is a $\delta > 0$ such that $|f(x) - f(y)| < \epsilon$ whenever $|x - y| < \delta$.

Lemma 1. *If* $0 < x$ *then there exists a* y *such that* $0 < y < x$*.*

Proof. Let $y = x/2$. $\square$

Lemma 2. *For every positive integer* n*,* $1 \cdot 3 \cdot 5 \cdots (2n-1) = \dfrac{(2n)!}{2^n \cdot n!}$*.*

Proof. Left to the reader. (Hint: Use induction.) $\square$