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Math 425: Abstract Algebra I

LaTeXExamples

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- First note that I made some vertical space above this using the command `\vksip .25in` Use this command liberally to help make your document readable.

- Math mode is generated with dollar signs. For example $a^2 + b^2 = c^2$. There is a difference between a and a.

- Centered equations can be made in many ways. Here are a few:

  1. Double dollar signs
  $$a_1 + a_2 + \cdots + a_n = 1$$

  2. Square brackets
  $$\begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

  3. Equation environment - numbered (only use this if you're going to refer to this equation again)
  $$x^2 - 2 = (x - \sqrt{2})(x + \sqrt{2}) \tag{1}$$

  4. Equation environment - unnumbered
  $$2435 \equiv 11 \pmod{24}$$

  5. Multiple lines with lined up equations
  $$
  \begin{aligned}
  1 + 2 + \cdots + n + n + 1 &= \frac{n(n+1)}{2} + (n+1) \\
  &= \frac{n(n+1)}{2} + \frac{2(n+1)}{2} \\
  &= \frac{(n+1)(n+2)}{2}
  \end{aligned}
  $$

  6. Multiple lines with explanations
  $$
  \begin{aligned}
  (n+1)! &= n!(n+1) && \text{definition of factorial} \\
  &\geq 2^n(n+1) && \text{inductive hypothesis} \\
  &\geq 2^n \cdot 2 && \text{assumption of } n \geq 3 \\
  &= 2^{n+1} && \text{exponent laws}
  \end{aligned}
  $$

- To write a proof use `\begin{proof}` and `\end{proof}`, and you will get something like this:

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Proof. Let S be a set with binary operation $*$. Assume there is an identity element of $*$ in S. Let $e_1, e_2 \in S$ be identity elements of S with respect to $*$. We want to show $e_1 = e_2$. Since e_1 is an identity element, we have

$$e_1 * e_2 = e_2.$$

Similarly since e_2 is an identity element,

$$e_1 * e_2 = e_1.$$

Combining these two equations, we see

$$e_2 = e_1 * e_2 = e_1.$$

We conclude that if an identity exits with respect to a binary operation, then that identity is unique. $\square$

- There are also examples in homework assignments. Please let me know if you have further questions.