LaTeX Math and Equations

Typesetting and Aligning Equations

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Inline Math

- Two modes of typesetting math in LaTeX
- Embedding math directly into text using dollar signs
- Example: `This formula $f(x) = x^2$ is an example.`
- Output equation: This formula $f(x) = x^2$ is an example.

The Equation and Align Environment

- Use `equation` environment for single equations
- Use `align` environment for multiple equations and automatic alignment
- Example code:

```
\documentclass{article}
\usepackage{amsmath}
\begin{document}
\begin{equation*}
  1 + 2 = 3
\end{equation*}
\begin{equation*}
  1 = 3 - 2
\end{equation*}
\begin{align*}
  1 + 2 &= 3\\
  1 &= 3 - 2
\end{align*}
```

Fractions and More

- LaTeX can typeset integrals, fractions, and more
- Example code:

```
\documentclass{article}
\usepackage{amsmath}
\begin{document}
\begin{align*}
  f(x) &= x^2\\
  g(x) &= \frac{1}{x}\\
  F(x) &= \int^a_b \frac{1}{3}x^3
\end{align*}
\end{document}
```

Matrices

- Display matrices using the `matrix` environment
- Matrices work within math environments
- Example code:

```
\begin{matrix}
1 & 0\\
0 & 1
\end{matrix}
```

- Output: $\begin{matrix} 1 & 0 \\ 0 & 1 \end{matrix}$

Brackets in Math Mode - Scaling

- Plain brackets don't scale with matrix size
- Use `\left[` and `\right]` to scale brackets
- Example code:

```
\left[
\begin{matrix}
1 & 0\\
0 & 1
\end{matrix}
\right]
```

- Output: $\left[\begin{matrix} 1 & 0 \\ 0 & 1 \end{matrix}\right]$

Conclusion

- LaTeX is great for typesetting math and equations
- Use the `equation` and `align` environments for single and multiple equations
- Use `matrix` environment for matrices
- Brackets can be scaled with `\left` and `\right`