

Writing L^AT_EX

Lecture 3

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- 1 Typesetting Mathematics
 - The \LaTeX File
 - Mathematical Expressions
 - Environments
 - Integers, Real Numbers, Etc.
- 2 Assignment

1 Typesetting Mathematics

- The \LaTeX File
- Mathematical Expressions
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2 Assignment

- L^AT_EX is a mathematical typesetting system.
- This slideshow was written in L^AT_EX.
- There are two modes: text and math.
- The dollar sign (\$) is used to toggle between the modes.

The L^AT_EX File

- A L^AT_EX file uses the `.tex` extension.
- The first line is

```
\documentclass[12pt]{article}
```

- This is followed by a preamble, which we will discuss later.
- The body of the document is placed between the delimiters

```
\begin{document}  
:  
\end{document}
```

Mathematical Expressions

- The basic operators.
 - Addition: `+`
 - Subtraction: `-`
 - Multiplication: `\cdot` or `\times`
 - Exponentiation: `^{\textit{exp}}`
 - Division: `/` or `\div` or `\frac{\textit{num}}{\textit{den}}`
 - Square root: `\sqrt{\textit{num}}`
- Extendible grouping symbols.
 - Parentheses: `\left(\dots\right)`
 - Square brackets: `\left[\dots\right]`
 - Curly braces: `\left\{\dots\right\}`

Mathematical Expressions

Example (Mathematical Expressions)

The \LaTeX expression

```
\left(\frac{2x-1}{x+1}\right)^{n+1}
```

is rendered as

$$\left(\frac{2x-1}{x+1}\right)^{n+1}$$

Mathematical Expressions

Example (Mathematical Expressions)

The \LaTeX expression

```
(n+1) ^ { \frac { 2x-1 } { x+1 } }
```

is rendered as

$$(n + 1)^{\frac{2x-1}{x+1}}$$

Example (Typefaces)

- The standard typefaces, in text mode.
 - Boldface: `\textbf{...}`
 - Italicized: `\textit{...}`
- The standard typefaces, in math mode.
 - Boldface: `\mathbf{...}`
 - Not italicized: `\text{...}`

The `align` Environment

- To display a series of equations, all aligned with the equal sign (or any symbol of your choice), use the `align` environment.
- The `amsmath` package is required for this.
- The alignment character is the ampersand `&`.
- Use `\\` to start a new line.
- An environment is delimited by `\begin{env-name}` and `\end{env-name}`.
- \LaTeX provides many kinds of environments.

The align Environment

- For example,

```
\begin{align*}
y &= (x+1)^2-1 \\
&= (x^2+2x+1)-1 \\
&= x^2+2x \\
&= x(x+2).
\end{align*}
```

will be rendered as

$$\begin{aligned}y &= (x + 1)^2 - 1 \\ &= (x^2 + 2x + 1) - 1 \\ &= x^2 + 2x \\ &= x(x + 2).\end{aligned}$$

The `align` Environment

- The `*` means “do not number the equations.”
- If we leave it off, then we get

$$y = (x + 1)^2 - 1 \tag{1}$$

$$= (x^2 + 2x + 1) - 1 \tag{2}$$

$$= x^2 + 2x \tag{3}$$

$$= x(x + 2). \tag{4}$$

Integers, Real Numbers, Etc.

- The **whole numbers** are $1, 2, 3, \dots$
- The **integers** are the whole numbers, their negatives, and zero:

$$\{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$$

- The **rational numbers** are the fractions of integers:

$$\left\{ \frac{a}{b} \mid a, b \text{ are integers, } b \neq 0 \right\}$$

Integers, Real Numbers, Etc.

- The **real numbers** are rational numbers together with the irrational numbers.
 - The real numbers are all numbers that can be expressed in terminating or nonterminating decimal form.
- The **complex numbers** are the numbers of the form $a + bi$, where a and b are real numbers and $i^2 = -1$.

Standard Symbols

- The standard symbols are
 - \mathbb{N} = the whole numbers.
 - \mathbb{Z} = the integers.
 - \mathbb{Q} = the rational numbers.
 - \mathbb{R} = the real numbers.
 - \mathbb{C} = the complex numbers.
- Use `\mathbb{ }` to create that type face.

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Assignment

Homework

- Presentation – Chapter 1:
- Written – Chapter 1: