

Math Mode

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Packages?

Math Mode

Math

Extras

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# Getting Started

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Recall from last week the 3 things you need to properly compile a LaTeX document:

```
\documentclass{article}
```

```
\begin{document}
```

```
\end{document}
```

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However, to create math symbols, those three things are not enough. We must also include the following commands:

```
\usepackage{amsmath}
```

```
\usepackage{amssymb}
```

# Something Different

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In general, we can compose our thoughts in a LaTeX editor the same way as in any text editor, but to do math we must do something new: Math Mode! The basic way to do enter and exit math mode is using dollar signs.

$x^2$

gives us  $x^2$

# Inline Math

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Actually, using dollar signs is the way to enter “inline math mode.” This means that it will create mathematical symbols, but it will squish them so that they end up the same height as the rest of your text. This looks must funny with “big” things like fractions. This is inline:  $\frac{1}{2}$ . This is not:  $\frac{1}{2}$ .

# Display Style Math

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The “other” type of math is called “display style.” It can be done in a number of ways:

<code>\$\$\displaystyle{ ... }\$</code>	-will produce "big" math on the same line as your text
<code>\$\$ ... \$\$</code>	-will produce "big" math, but make a new line and center it
<code>\[ ... \]</code>	-is the same as <code>\$\$ ... \$\$</code>

# How do we format the math in math mode?

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Basically, math typesetting is intuitive:  $2+2=4$  is  $2 + 2 = 4$ . (Spaces are mostly ignored in LaTeX, so  $2+2$  is the same as  $2 + 2$ ).

exponents:  $e^x$   
subscripts:  $x_2$

For things like this, if you want more than one character in the exponent or subscript, you need to enclose them in curly braces. So  $x^{\sin x}$  is

$x^{\sin x}$



# Three Letter Words

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Many functions in LaTeX are codified as “three letter words.”  
These include:

`\sin{...}`

`\cos{...}`

`\lim_{...}`

`\sum_{...}^{...}`

`\int_{...}^{...}`

Note: Sum, lim and int (integral) will all show up smashed if  
not in displaystyle math:  $\int_x^y \sin x$  instead of  $\int_x^y \sin x$

# Some other cool things

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Here are other cool commands to mess around with:

<code>\approx</code>	$\approx$	<code>\equiv</code>	$\equiv$
<code>\leq</code>	$\leq$	<code>\geq</code>	$\geq$
<code>\exists</code>	$\exists$	<code>\forall</code>	$\forall$
<code>\cup</code>	$\cup$	<code>\cap</code>	$\cap$
<code>\frac{1}{2}</code>	$\frac{1}{2}$	<code>\pm</code>	$\pm$

And many many more!

# Spaces

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In math mode, extra spacing must be done using a backslash, and if you want normal text use the command `\text{...}`.

`$x^z \ \ \ \ \ \text{if } x < z$` gives  $x^z \quad \text{if } x < z$

Normally that space would not be there. Note: the `\` adds one space of blank space. `\quad` gives four blank spaces, and `\qquad` gives 8 blank spaces. So, alternate code for the above math would be `$x^z \quad \text{if } x < z$`

# delimiters

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When using `displaystyle` math, sometimes you need to you parenthesis, and you don't want them to look like this:

$$\left(\frac{1}{2}\right)$$

.

So, you need to you the `\right` and `\left` commands. Thus, you would want your code to look like this:

```
\[ \left( \frac{1}{2} \right) \]
```

to produce something like this:

$$\left(\frac{1}{2}\right).$$

Finally, if you want to use curly braces, the command is

`\{ \}` (since they otherwise are used simply to mark your code).