Basic Mathematical Elements

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1 Fractions

To create a fraction, you must use the `\frac{numerator}{demoninator}` command. (For those who need their memories refreshed, that's the top and bottom respectively!) You can also embed fractions within fractions, as shown in the examples below:

$$\frac{x+y}{y-z}$$

To illustrate nested fractions:

$$\frac{\frac{1}{x}+\frac{1}{y}}{y-z}$$

2 Powers and Indices

Powers and indices are mathematically equivalent to superscripts and subscripts in normal text mode. The carat (`^`) character is used to raise something, and the underscore (`_`) is for lowering. How to use them is best shown by example:

Powers	`$x^n$`	x^n
	`$x^{2n}$`	x^{2n}
Indices	`$n_i$`	n_i
	`$n_{ij}$`	n_{ij}

3 Roots

The typical square root can be achieved with `\sqrt{x}`:

$$\sqrt{x}$$

Regardless of the size of root you want, you still use the `\sqrt{}` command, even if you want the cube-root. You simply pass an additional option to the command if you want to change the default behavour. E.g., `\sqrt[3]{8}`

$$\sqrt[3]{\frac{x^2}{4xy+\pi}}$$

Note how the length and height of the root notation automatically resizes to the size of the equation within it.

4 Brackets

You may recall that you already have the ( ) [ ] symbols at your disposal, which should be more than adequate for most peoples' needs. So why the need for a decicated section? Well, I think that can be shown by example:

$$(\frac{x^2}{y^3}) \tag{1}$$

As you can see, equation 1 looks odd, because the brackets do not scale to contain the entire fraction. What we wanted is illustrated in equation 2:

$$\left(\frac{x^2}{y^3}\right) \tag{2}$$

This was achieved using special bracket commands. You tell LaTeXthat you want a left bracket, rather than the literal '(' symbol, and then it will determine the appropriate size for it once it processes the internal contents.

Left	Right	Output
`\left(`	`\right)`	$(\ldots)$
`\left[`	`\right]`	$[\ldots]$
`\left\{`	`\right\}`	$\{\ldots\}$
`\left|`	`\right|`	$\|\ldots\|$