LaTeX class 2

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1 Math mode

By default, LaTeX is in *text mode*, which is used for typing words and sentences. If you want to type mathematical notation, you have to enter *math mode*. This can be done in a few ways.

1.1 In-line equations

The easiest is by using dollar sign: one dollar sign enters math mode, and the next exits math mode—this gives an in-line equation. For example, you could write $E = mc^2$ or $a + b = c$. Notice how the variables appear italicised and the spacing is nice. Compare with: a+b=c.

All mathematical variables, symbols, equations and so on, should be entered in math mode. For example, three times two is 3×2, three plus two is $3 + 2$, and three divided by two is $\frac{3}{2}$ or $3/2$. You can do square roots $\sqrt{x^2 + 1}$ and cube roots $\sqrt[3]{x^3 + 1}$ and nth roots $\sqrt[n]{x^n + 1}$. Exponents are easy, but make sure you use braces if needed: compare $a^b + 1$ and a^{b+1}.

Notice that spaces are ignored in math mode do nothing: $abcdef$ versus $abcdef$. To make a space appear, put a backslash before it: $a\ b\ c\ d\ e\ f$. There are smaller and larger spaces too: $a\,b\,c\,d\quad e\qquad f$.

1.2 Displayed equations

Sometimes, either for emphasis or for readability, equations are put on their own line. This can be done using double dollar signs instead of single dollar signs. For example

$$\forall n \in \mathbb{N},\ \sum_{k=0}^{n} k = \frac{n(n+1)}{2}$$

If you want to enter text mode after you've already entered math mode, you can do using the 'text' command, for example

$$\sum_{k=0}^{n} k = \frac{n(n+1)}{2} \text{ for all } n \in \mathbb{N}$$

If you want it to be enumerated, you can use the 'equation' environment:

1.3 Aligned equations

If you have a chain of equations, you can make them line up nicely using the 'align*' environment, which is another way of entering math mode. For example:

$$\begin{aligned}
(n+1)! - n! &= (n+1) \cdot n! - n! && \text{by definition of factorial} \\
&= (n+1-1) \cdot n! && \text{common factor of } n! \\
&= n \cdot n! && \text{cancelling the 1s}
\end{aligned}$$