chapter08 LaTeX Learning

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Abstract

this is chapter08 learning of LaTeXand i find it interesting.

keep going!!

Don't stop till you get enough

Contents

1 The Basics

The equation representing a straight line in the Cartesian plane is of the form $ax + by + c = 0$, where a, b, c are constants.

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1.1 Superscripts and subscripts

In the seventeenth century, Fermat conjectured that if $n > 2$, then there are no intergers x, y, z for which

$$x^n + y^n = z^n.$$

This is proved in 1994 by Andrew Wiles.

$$x^{mn} \qquad (x^n)^m \qquad x^m n$$

The sequence (X_n) defined by

$$x_1 = 1, \qquad x_2 = 1, \qquad x_n = x_{n-1} + x_{n-2} \; (n > 2)$$

1.2 Roots

Which is greater $\sqrt[4]{5}$ or $\sqrt[5]{4}$?

2 custom commands

Here is the *rjpvector* by rjp:

$$x_1, x_2, \ldots, x_n$$

$$a = 1 \tag{2.1}$$

3 more on maths

3.1 single equation

The equation representing a straight line in the cartesian plane is of the form

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$$ax + by + c = 0 \tag{3.1}$$

where a, b, c are constants.

Thus for all real numbers x we have

$$x \leq |x| \quad \text{and} \quad x \geq |x|$$

and so

$$x \leq |x| \quad \text{for all } x \text{ in } R$$

$$\begin{multline}(a+b+c+d+e)^2 = a^2 + b^2 + c^2 + d^2 + e^2 \\ + 2ab + 2ac + 2ad + 2ae + 2bc + 2bd + 2be + 2cd + 2ce + 2de\end{multline}$$

i am really happy, yesterday i went gym and work out. rjp is a handsome boy.

$$\begin{multline}(a+b+c+d+e)^2 = a^2 + b^2 + c^2 + d^2 + e^2 \\ + 2ab + 2ac + 2ad + 2ae \\ + 2bc + 2be + 2bd \\ + 2cd + 2ce \\ + 2de\end{multline}$$

$$
\begin{aligned}
(a+b+c+d+e)^2 = a^2 + b^2 + c^2 + d^2 + e^2 \\
&+ 2ab + 2ac + 2ad + 2ae \\
&+ 2bc + 2be + 2bd \\
&+ 2cd + 2ce \\
&+ 2de
\end{aligned}
$$

$$
\begin{aligned}
(a+b)^2 &= (a+b)(a+b) \\
&= a^2 + ab + ba + b^2 \\
&= a^2 + 2ab + b^2
\end{aligned}
$$

$$a = 1b = 2 \tag{3.2}$$

3.2 group of equations

$$
\begin{gathered}
(a,b) + (c,d) = (a+c, b+d) \\
(a,b)(c,d) = (ac, bd)
\end{gathered}
$$

$$(a,b) + (c,d) = (a+c, b+d) \tag{3.3}$$

$$(a,b)(c,d) = (ac, bd) \tag{3.4}$$

Thus x, y, z satisfy the equations

$$
\begin{gathered}
x + y - z = 1 \\
x - y + z = 1
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and by hypothesis

$$x + y + z = 1$$

Compare the following sets of equations

$$
\begin{aligned}
\cos^2 x + \sin^2 x &= 1 & \cosh^2 x - \sinh^2 x &= 1 \\
\cos^2 x - \sin^2 x &= \cos 2x & \cosh^2 x + \sinh^2 x &= cosh 2x
\end{aligned}
$$

Compare the following sets fo equations

$$
\begin{aligned}
\cos^2 x + \sin^2 x &= 1 \\
\cos^2 x - \sin^2 x &= \cos 2x
\end{aligned}
\quad \text{and} \quad
\begin{aligned}
\cosh^2 x - \sinh^2 x &= 1 \\
\cosh^2 x + \sinh^2 x & \cosh 2x
\end{aligned}
$$

$$
|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x \leq 0 \end{cases}
$$

3.3 numbered equation

The equation represents a straight line in the plane

$$ax + by + c = 0 \tag{3.5}$$

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$$\begin{aligned} x + y - z &= 1 \\ x - y + z &= 1 \end{aligned}$$

and by hypothesis

$$x + y + z = 1 \tag{rjpH}$$

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$$x + y + z = 1 \tag{rjpH}$$

$$\begin{aligned} (a + b)^2 &= (a + b)(a + b) \\ &= a^2 + ab + ba + b^2 \\ &= a^2 + 2ab + b^2 \end{aligned} \tag{3.6}$$

4 mathematics miscellany

4.1 matrices

The system of equations

$$\begin{aligned} x + y - z &= 1 \\ x - y + z &= 1 \\ x + y + z &= 1 \end{aligned}$$

can be written in matraix terms as

$$\begin{pmatrix}1 & 1 & -1\\ 1 & -1 & 1\\ 1 & 1 & 1\end{pmatrix}\begin{pmatrix}x\\ y\\ z\end{pmatrix}=\begin{pmatrix}1\\ 1\\ 1\end{pmatrix}$$

Here, the pmatraix $\begin{pmatrix}1 & 1 & -1\\ 1 & -1 & 1\\ 1 & 1 & 1\end{pmatrix}$ is invertible

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sometimes mathematics write matrices within parentheses as in $\begin{pmatrix}a & b\\ c & d\end{pmatrix}$ while others prefer quare brackets as in $\begin{bmatrix}a & b\\ c & d\end{bmatrix}$

the determination of $\begin{vmatrix}a & b\\ c & d\end{vmatrix}$ is defined by

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a general matrix of $m \times n$ is like

$$\begin{bmatrix}a_{11} & a_{12} & \ldots & a_{1n}\\ a_{21} & a_{22} & \ldots & a_{2n}\\ \multicolumn{4}{c}{\dotfill}\\ a_{m1} & a_{m2} & \ldots & a_{mn}\end{bmatrix}$$

4.2 dots

consider a finite sequence $X_1, X_2, \ldots,$ its sum $X_1 + X_2 + \ldots$ and product $X_1 X_2 \ldots.$

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4.3 delimiters

since $\left|\begin{smallmatrix}a & h & g\\ h & b & f\\ g & f & c\end{smallmatrix}\right| = 0$, the matrix $\left(\begin{smallmatrix}a & h & g\\ h & b & f\\ g & f & c\end{smallmatrix}\right)$ is not invertible.

$$\left.\begin{aligned} u_x &= v_y \\ u_y &= -v_x \end{aligned}\right\} \quad \text{Cauchy-Riemann Equations}$$

$$(x+y)^2 - (x-y)^2 = ((x+y)+(x-y))\,((x+y)-(x-y))$$

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For n-tuples of comlex numbers $(x_1, x_2, \ldots, x_n)$ and $(y_1, y_2, \ldots, y_n)$

$$\left(\sum_{k=1}^{n} |x_k y_k|\right)^2 \leq \left(\sum_{k=1}^{n} |x_k|\right)\left(\sum_{k=1}^{n} |y_k|\right)$$

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4.4 putting one over another

From the binomial theorem, it easily follows that if n is an even number, then

$$1 - \binom{1}{n}\frac{1}{2} + \binom{2}{n}\frac{1}{2^2} - \cdots - \binom{n-1}{n}\frac{1}{2^{n-1}} = 0$$

Since (X_n) converges to 0, there exists a positive integer p such that

$$|x_n| < \frac{1}{2} \quad \text{for all } n \geq p$$

The Christoffel symbol $\left\{ {ij \atop k} \right\}$ of the second kind is related to the Christoffel symbol $\left[{ij \atop k} \right]$ of the first kind by the equation

$$\left\{ {ij \atop k} \right\} = g^{k1}\left[{ij \atop k} \right] + g^{k2}\left[{ij \atop k} \right]$$

$$\frac{4}{\pi} = 1 + \cfrac{1^2}{2 + \cfrac{3^2}{2 + \cfrac{5^2}{2 + \cdots}}}$$

Thus we can see that

$$0 \to A \xrightarrow{f} B \xrightarrow{g} C \to 0$$

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Euler not noly proved that the series $\sum_{n=1}^{\infty} \frac{1}{n^2}$ converges, but also that

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Thus $\lim\limits_{x\to\infty} \int_0^x \frac{\sin x}{x} \mathrm{d}x = \frac{\pi}{2}$ and so by definition

$$\int_0^{\infty} \frac{\sin x}{x} \mathrm{d}x = \frac{\pi}{2}$$

$$p_k(x) = \prod_{\substack{i=1 \\ i \neq k}}^{n} \left(\frac{x - t_i}{t_k - t_i} \right)$$

4.5 the many faces of math

inputs: Two pointclouds: $A = \{a_i\}$, $B = \{b_i\}$
outputs: An initial transformation T_0