

The Cauchy Integral Formula

Steve Bell

February 23, 2009

A slide with a definition and a theorem

Definition

The residue of an analytic function f at an isolated singularity a is equal to the coefficient of $(z - a)^{-1}$ in the Laurent expansion for f about the point a .

Theorem

If $P(z)$ and $Q(z)$ are complex polynomials such that the degree of P is at least two less than the degree of Q , and Q has no zeroes on the real line, then

$$\int_{-\infty}^{\infty} \frac{P(t)}{Q(t)} dt = 2\pi i \sum_{j=1}^N \operatorname{Res}_{a_j} \frac{P}{Q},$$

where $\{a_j\}_{j=1}^N$ are the distinct zeroes of Q in the Upper Half Plane (UHP).

Cauchy Integral Formula basics

I'm using the **enumerate** environment on this slide.

- 1 The Cauchy Integral Formula was discovered by Cauchy.
- 2 It reveals that an analytic function is determined by its values on a rather small set.
- 3 Some people think it is the best formula around.

Push **Control-L** to enter Full Screen mode and use the left and right arrow keys to move through the demo.

Cauchy Integral Formula basics

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The Cauchy Integral Formula in living color

You can do silly things in Beamer that will make you look like an idiot. For example:

The *Cauchy Integral Formula* in three different colors:

$$f(a) = \frac{1}{2\pi} \int_{\gamma} \frac{f(z)}{z-a} dz$$

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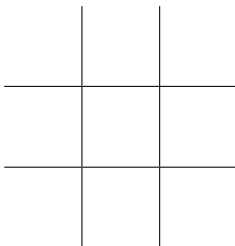
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Tic-Tac-Toe via tabular

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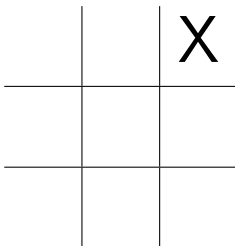
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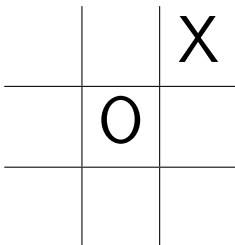
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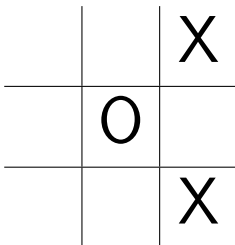
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Future research.

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Push the ESCAPE key to get out of Full Screen mode.