Examination 1 takes place on Thursday, October 1.

Please bring your own paper to the examination.

$$\sum_{n=0}^{\infty} c_n z^n \quad \text{radius of convergence } R.$$

Differentiated series

$$\sum_{n=0}^{\infty} n c_n z^{n-1} \quad \text{has same radius}$$

because $\lim_{n\to\infty} n^{\frac{1}{n}} =$

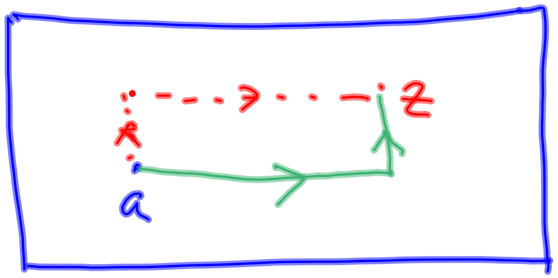
$$\lim_{n\to\infty} \exp\left(\frac{1}{n}\log(n)\right) = 1.$$

Major topics

- power series
- residues
- Cauchy-Riemann equations / analytic
- stereographic projection
- harmonic functions
- $\mathbb{C}$
- integral representation for analytic functions
- elementary functions (exp, sin, cos)

Analytic functions in rectangles have antiderivatives.

$$F(z) := \int_a^z f(w)\,dw$$



Define the integration path to be first horizontal and then vertical.
But by Cauchy's rectangle theorem, integrating first vertically and then horizontally gives same answer.

By fundamental theorem of real calculus

$$\frac{\partial F}{\partial x} = f \quad \text{and} \quad \frac{\partial F}{\partial y} = i f$$

So F satisfies Cauchy-Riemann equation.