Computational Complex Analysis : : Class 05

January 19, 2024

Ahmed Saad Sabit, Rice University

If the derivative exists for a point z_0, then we have

$$\frac{\partial f}{\partial x} = \frac{1}{i}\frac{\partial f}{\partial y}$$

Suppose $f = f(z)$ has continuous partial derivatives with respect to x and y. Now we want to show f' exists. We know that f is differentiable in real variable sense.

$$f(z+h) = f(x+h_1, y+h_2) = f(x,y) + \frac{\partial f}{\partial x}(x,y)h_1 + \frac{\partial f}{\partial y}h_2 + \text{Smaller Terms}$$

Here $h = h_1 + ih_2$ Using this we can come to the proof,

$$\lim_{h\to 0} \frac{f(z+h) - f(z)}{h}$$

This thing exists. There is a proof for this. TODO.

Terminology

Terminology Frank Jones	**Everyone except Frank Jones and his followers**
Cauchy-Riemann Equation	Cauchy-Riemann Equations

Cauchy Riemann equation in polar form is

$$\frac{\partial f}{\partial r} = \frac{1}{ir}\frac{\partial f}{\partial \theta}$$