FUNCTIONS OF COMPLEX VARIABLES

Given that

z = x + yi

w = f(z)={z rsub 2}

w = {(x + yi) rsup 2}

w = {x rsup 2} + 2xyi – {y rsup 2}

w = ({x rsup 2} - {y rsup 2}) + 2xyi

You’ll see that the answer we got for w has the variables of the input value in it.

A complex function f, is a pair of real functions put together. Our goal is to do calculus on these functions. Our complex functions have to be differentiable. Their derivatives have to be deffined.

HOLOMORPHIC FUNCTIONS

Analytic or Regular functions

f(z) is holomorphic in a region R of the complex plane if it has a derivative at every point in R

From our knowledge in differentiation that

For a limit to exist and for the function to be differentiable,

f(x) = {x rsup 2}

You’ll notice that the functions of real numbers are usually drawn on the x-y plane and they are represented with lines. Therefore the lim from the left and right is required for the function to be differentiable

However, for complex functions, it is on a 3d-plane and for it to be differentiable, the limit from all sides have to be equal

Given that f(z) = {z rsup 3}