Formula Sheet EE2M11

MaybE_Tree

2022-09-07

Principal Argument

$$-\pi < \theta \leq \pi$$

Triangle Inequality

$$\begin{cases} |z_1 \pm z_2| \leq |z_1| + |z_2| \\ |z_1 \pm z_2| \geq |z_1| - |z_2| \end{cases}$$

Limits to Infinity

$$\begin{cases} \lim\limits_{z \to z_0} f(z) = \infty \iff \lim\limits_{z \to z_0} \dfrac{1}{f(z)} = 0 \\ \lim\limits_{z \to \infty} f(z) = L \iff \lim\limits_{z \to 0} f\left(\dfrac{1}{z}\right) = L \end{cases}$$

L must be finite, maybe??

Cauchy-Riemann

CR1	u	v
x	$\dfrac{du}{dx}$	$\dfrac{dv}{dx}$
y	$\dfrac{du}{dy}$	$\dfrac{dv}{dy}$

For
$f(x, y) = u(x + y) + iv(x, y)$

Harmonic Check

$$\frac{\delta^2 u}{\delta x^2} + \frac{\delta^2 u}{\delta y^2} = 0 \implies \frac{\iint\limits_D f(z)}{\text{Area}(D)} = f(z_c)$$

For
$f(x, y) = u(x + y) + iv(x, y)$
Around a circular domain D with centerpointn z_c

Exponential Function

$$e^z = e^x(\cos y + i \sin y)$$

Trig Functions

$$\begin{cases} \sin z = \dfrac{1}{2i}(e^{iz} - e^{-iz}) \\ \cos z = \dfrac{1}{2}(e^{iz} + e^{-iz}) \end{cases}$$

All the familiar identities apply, but range is no longer ± 1 .

	0	$1/6\pi$	$1/4\pi$	$1/3\pi$	$1/2\pi$
sin	0	$1/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	1
cos	1	$\sqrt{3}/2$	$\sqrt{2}/2$	$1/2$	0
tan	0	$\sqrt{3}/3$	1	$\sqrt{3}$	???