Complex Analysis

Math 312 MWF 10:30-11:25am
Spring 1996 201 Fowler

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Worksheet #3 (01/26/96)

In the previous class we proved the *Triangle Inequality*

$$|z_1 + z_2| \leq |z_1| + |z_2|$$

It is also true in a more general form known as the *Cauchy-Schwarz Inequality*

$$|z_1 + z_2 + z_3 + \ldots + z_n| \leq |z_1| + |z_2| + |z_3| + \ldots + |z_n| \quad (1)$$

$$\left|\sum_{k=1}^{n} z_k\right| \leq \sum_{k=1}^{n} |z_k| \quad (2)$$

SUMMARY Polar forms and Exponential forms

We have been considering the complex plane as an analogue to the 2-d cartesian x-y plane. You may recall that there are other coordinate systems that can be imposed on the 2-d plane. One of those coordinate systems is known as **polar coordinates**.
Write $z_1 = 1 + i\sqrt{3}$ in *polar form* and sketch it on the graph below.

Compute the polar form of $z_2 = -\sqrt{3} + i$ and sketch it on the same graph.

Do you see any interesting geometrical relationship between z_1 and z_2?

Do you notice any interesting algebraic relationship between z_1 and z_2?

Write down a general relationship between arg($z_1 z_2$) and arg(z_1) and arg(z_2)

Now consider what happens if $z_2 = \frac{1}{z_1} = {z_1}^{-1}$.
Write down a general relationship between arg($\frac{z_1}{z_2}$) and arg(z_1) and arg(z_2)