**HOMEWORK 1.**

Due Friday, January 30.

1. Compute $\sqrt[5]{-4+3i}$.

2. Write the complex number $1+\cos\alpha + i\sin\alpha$ in the polar form.

3. Prove the inequality $|z_1+z_2| \geq \frac{1}{2}\left(|z_1|+|z_2|\right)\left|\frac{z_1}{|z_1|}+\frac{z_2}{|z_2|}\right|$.

4. Prove the inequality $\left|\frac{z}{|z|}-1\right| \leq |\arg z|$.

5. Determine the set of points that satisfy the condition $\operatorname{Re}\left(\frac{z-z_1}{z-z_2}\right)=0$ where $z_1$ and $z_2$ are fixed complex numbers.

6. Determine the set of points that satisfy the condition $\operatorname{Im}\left(\frac{z-z_1}{z-z_2}\right)=0$ where $z_1$ and $z_2$ are fixed complex numbers.

7. Determine the set of points that satisfy the condition $|2z| > |1+z^2|$.

8. Let $z_1$ and $z_2$ be two elements of $\mathbb{C}_\infty$. Determine the set of points $S$ in $\mathbb{C}_\infty$ such that the corresponding set $S'$ on the sphere is a circle that is equidistant from $z_1'$ and $z_2'$ (the points on the sphere corresponding to $z_1$ and $z_2$).