Home work for the week of Nov 10. Due Nov 17.

1. Show that there exists a conformal map between the regions $a < |z| < b$ and $c < |z| < d$ if and only if $\frac{b}{a} = \frac{d}{c}$.

2. If C is a circle $|z - a| = r$ in the complex plane that does not pass through 0 and $f(z) = \log |z|$ when is

$$\frac{1}{2\pi} \int_0^{2\pi} f(a + re^{i\theta}) d\theta = f(a)$$

3. If some times the equality does not hold in 2, is there an inequality that is always valid?