

[20pts] Homework 1 (Due Friday, Jan 27 by 5pm
at L17 408 or hand in in class)

[3pts] (1) Find $\text{Arg}((\sqrt{3} - i)^{200})$.

[3+3=6pts] (2) Sketch the following set of complex numbers:

(a) $\left\{ z : \left| \frac{1}{z+1+i} \right| > 1 \right\}$

(b) $\left\{ z : \text{Arg}(z+i) = \pi/4 \right\}$

[3+3=6pts] (3) Under the map $w = \frac{1}{z}$ show that

(i) The image of any horizontal line (that does not pass the origin) is a circle (minus one point).

(ii) The image of any vertical line (that does not pass thru the origin) is a circle (minus one point)

HINT: In each case get $u^2 + v^2$ in terms of u or v .

[5pts] (4) Do one part:

(i) Prove using the definition of limit that

$$\lim_{z \rightarrow 1+i} 2\bar{z} + i = 2-i$$

(ii) Prove using the definition of limit that

$$\lim_{z \rightarrow z_0} \text{Re}(z) = \text{Re}(z_0).$$