PHYS 301
HANDOUT 2

1. Prove that $|w\bar{z} + \bar{w}z| \le 2|wz|$.

2. Find the qubic roots of the complex number $z = -8i$.

3. Find the square root of *i.*

4. Find the n-th root of a complex number $z = re^{i\theta}$.

5. Find the 8-th of 1. Represent the solutions graphically. Add all the roots, what do you observe?

6. Write in the form $f(z) = u(x,y) + iv(x,y)$ the complex functions $f(z) = z^2$, $f(z) = z + 1/z$.

7. Find how is mapped the region of $\mathrm{Im}\, z \ge 0$ with the functions $w = z^2$, $w = \bar{z}$.

8. Show that the continuity of the real and imaginary part of a complex function $f(z)$ implies that the function $f(z)$ is continuous.

9. Calculate the following limits: a) $\lim_{z\to 1+i}\left(z^2 - 5z + 10\right)$ b) $\lim_{z\to -2i}\dfrac{(2z+3)(z-1)}{z^2 - 2z + 4}$

c) $\lim_{z\to 2e^{i\pi/3}}\dfrac{z^3+8}{z^4+4z^2+16}$.h

(Ans: a) $5 - 3i$, b) $-\dfrac{1}{2} + \dfrac{11}{4}i$ c) $\dfrac{3}{8} - \dfrac{\sqrt{3}}{8}i$)

10. Show that the limit $\lim_{z\to 0}\dfrac{z^*}{z}$ does not exist.