

1) Graph: $\left\{ z \in \mathbb{C} : \left| \frac{z-3}{z+3} \right| = 2 \right\}$

2) Find the following & express in the form $x+iy$.
Graph the solutions.

a) 4th roots of $-6i$; b) cube roots of 8.

3) Find all solutions of $z^2 + (i-2)z + 3-i = 0$

4) Find a bilinear (i.e. Möbius) transformation mapping
 0 to i , $-i$ to 1 & -1 to 0 .

5) Find the fixed points of the transformation $w = \frac{z-5}{z+4}$
(i.e., find all z s.t. $w(z) = z$)

6) Find all z for which $\cos z = i$

7) Calculate: a) $\lim_{z \rightarrow i} \frac{-1}{(z-i)^2}$; b) $\lim_{z \rightarrow \infty} \frac{2z^4+1}{z^4-1}$

8) a) Show that $f(z) = x^2 + iy^3$ is not analytic anywhere. b) Show that f satisfies the Cauchy-Riemann equations at $(0,0)$

c) Is there a contradiction here?

9) Verify the Cauchy Riemann equations for $f(z) = e^{z^2}$

10) Calculate $\frac{d}{dz} \frac{2z-i}{z+2i}$; $\frac{d}{dz} \cos^2(z^2+iz)$