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

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 $w = \frac{2z+5}{z+4}$ (i.e., find all $z$ s.t. $w(z) = z$).

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

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

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 $f(z) = z^2$.

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