

1. Compute  $\frac{3i+5}{4-3i}$
2.  $z \in \mathbb{C}$ . Prove that  $z \in \mathbb{R}$  if and only if  $z = \bar{z}$ .
3.  $z_1, z_2 \in \mathbb{C}$ . Prove that  $z_1 z_2 = 0$  if and only if at least one of  $z_1, z_2$  is 0.
4. If  $z = x + yi$ , where  $x, y \in \mathbb{R}$ , prove that  $\sqrt{2}|z| \geq |x| + |y|$
5. Sketch the region in the complex plane described by  $|z + i| \leq 4$ .
6. Compute  $(1 + \sqrt{3}i)^6$
7.  $z_1, z_2 \in \mathbb{C}$ . Show that if  $Re(z_1) > 0$  and  $Re(z_2) > 0$ , then

$$Arg(z_1 z_2) = Arg(z_1) + Arg(z_2)$$

8. Find all the complex solutions of the equation  $z^4 + 4 = 0$ .