

PROBLEM 1. Compute and write in standard form ($a + bi$ with $a, b \in \mathbb{R}$):

- (a) $\overline{9 - 6i}$
- (b) $|-3 + 2i|$
- (c) $(-3 + 2i)^2$
- (d) $(1 + i)/(1 - i)$
- (e) $\text{Im}((1 + i)/(1 - i))$.

PROBLEM 2. Let $z = \cos(\theta) + \sin(\theta)i$ for some $\theta \in [0, 2\pi)$.

- (a) Express $1/z$ in the form $a + bi$ with $a, b \in \mathbb{R}$.
- (b) Plot z and $1/z$ for various values of θ . How are z and $1/z$ related geometrically?

PROBLEM 3. Let $z = (\sqrt{2}/2, \sqrt{2}/2)$. Compute and plot z^n in the plane for $n \geq 0$. (By definition $z^0 = 1$. Plot $1, z, z^2, z^3, \dots$, in turn. A pattern will eventually arise.)

PROBLEM 4. Let $z \in \mathbb{C}$. Prove that $|z| \geq |\text{Im}(z)|$.