

475 SPRING 2025 PROBLEM SET #1

**Problem 1.** Express the following complex numbers in rectangular form, i.e.  $a + ib$  for  $a, b \in \mathbb{R}$ .

- (a)  $\frac{1}{7 + 2i}$
- (b)  $\frac{(2 + i)(5 + 2i)}{1 - i}$
- (c)  $\left(-\frac{1}{2} + i\frac{\sqrt{3}}{2}\right)^4$
- (d)  $i^2, i^3, i^4, \dots$

**Problem 2.** Solve the equation  $z^2 - 2i = 0$ .

**Problem 3.** Solve the equation  $z^2 + \sqrt{32}iz - 6i = 0$ .

**Problem 4.** Solve the equation  $z^3 + i = 0$ .

**Problem 5.** Solve the equation  $z^4 + 1 - \sqrt{3}i = 0$ .

**Problem 6.** Identify the set of points which satisfy

- (a)  $|z| = \operatorname{Re}(z) + 1$
- (b)  $|z - i| \leq 1$
- (c)  $z^5 = \bar{z}$ .