

# MAΘ Competition Team Homework Set 5

Anders Christensen, Hannah Kim

November 14, 2025

Due date: November 20, 2025

**Problem 1.** What is  $(\overline{1 - 2i})(\overline{35 + 3i})$ ?

**Problem 2.** Find  $\left| \frac{3 + 10i}{4 - 2i} \right|$ .

**Problem 3.** Compute  $(2 \operatorname{cis} 60^\circ)^6$  and express the answer in rectangular form (like  $a + bi$ ).

**Problem 4.** Let  $z$  satisfy  $z + 6i = iz$ . Find  $z$ .

**Problem 5.** Find  $c$  if  $a, b, c$  are positive integers such that

$$c = (a + bi)^3 - 107i$$

**Problem 6.** The polynomial  $(z + i)(z + 2i)(z + 3i) + 10$  has three roots in the complex plane. Give the perimeter of the triangle formed by these three roots.

**Problem 7.** For what value of  $n$  is  $i + 2i^2 + 3i^3 + \cdots + ni^n = 48 + 49i$ ?