

## Complex Numbers - Practice Exam 5

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**Question 1.** Let  $z_1 = 4 - i$  and  $z_2 = \sqrt{6} + i\sqrt{5}$ . Calculate the modulus of  $w$ , where

$$w = \frac{3(z_1 + z_2)}{iz_2 + \overline{z_1}}.$$

**Question 2.** Let  $p(z) = z^3 + \lambda z^2 + \mu z + \xi$ , where  $\lambda, \mu, \xi \in \mathbb{R}$  are nonzero. Suppose  $z = 3$  and  $z = 1 + 2i$  are roots of  $p(z)$ . Determine the values of  $\lambda, \mu$  and  $\xi$ .

**Question 3.** (Dr. Lloyd Gunatilake). Determine the value of  $k \in \mathbb{R}$  such that  $p(ki) = 0$ , where  $p(z) = z^3 + 7z - 6i = 0$ .

**Question 4.** Suppose that

$$z^8 - 2z^4 \cos \vartheta + 1 = (z^4 - e^{i\vartheta})(z^4 - e^{-i\vartheta}).$$

Determine the solutions of

$$z^8 - z^4 = -1$$

in polar form.