

Complex Numbers - Practice Exam 1

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Question 1. Convert the following expressions to polar form.

- a. $z = 2 - 2i$.
- b. $z = \sqrt{3} + i$.

Question 2. Calculate the 6 roots of $1 + i$.

Question 3. Consider the equation $f : \mathbb{C} \rightarrow \mathbb{C}$ defined by

$$f(z) = z^3 + z^2 + z - 39.$$

- a. State the conjugate root theorem.
- b. Verify that $z = -2 + 3i$ is a root of f .
- c. Using the conjugate root theorem, determine one other root of f .
- d. Let $z = x + iy$ be the third root of f . Without calculating explicitly the value of z , use the conjugate root theorem to deduce information pertaining to x or y .
- e. Determine the third root of f .
- f. How can we ensure that there is no fourth root of f , distinct from the three we have found thus far?