

- (1) Solve the following quadratic equation
 $z^2 + (1 + i)z + i = 0$.
- (2) Let $P(z)$ be a polynomial with real coefficients.
Prove that if z_0 is a root of $P(z)$ then \bar{z}_0 is also a root of $P(z)$.
- (3) Let $P(z), Q(z)$ be two polynomials with complex coefficients such that $P(n) = Q(n)$ for any natural n .
Prove that $P(z) = Q(z)$ for all z .
- (4) Express the following number as $a + bi$ for some real a, b :

$$\frac{(3 - \sqrt{3}i)^{71}}{(1 - i)^{53}}$$

- (5) Find all complex solutions of the following equation

$$x^6 + 7x^3 - 8 = 0$$