Section 2: Complex roots of polynomials

Exercise level 1

1. One root of the quadratic equation $z^2 + pz + q = 0$, where p and q are real, is $4 - 5\mathrm{i}$.
   (i) Write down the other root of the quadratic equation.
   (ii) Find the values of p and q.

2. (i) Verify that $z = 1 + \mathrm{i}$ is a root of the equation $z^3 - 2z + 4 = 0$.
   (ii) Write down the other complex root.
   (iii)Find the third root of the equation.

3. Find the real root of the equation $z^3 + z + 10 = 0$, given that one complex root is $1 - 2\mathrm{i}$.

4. Given that $1 + 3\mathrm{i}$ is a root of the equation $z^3 - 3z^2 + 12z - 10 = 0$, find the other two roots.

5. Solve the cubic equation $z^3 - 4z^2 + 6z - 4 = 0$ given that $z = 2$ is a root.