

Solutions to Quiz 1

Problem 1 Find the real and imaginary parts of the complex number

$$z = \frac{3 + 5i}{7i + 1},$$

Solution: We can simplify this complex number to the form

$$\begin{aligned} z &= \frac{3 + 5i}{7i + 1} \\ &= \frac{(3 + 5i)((-7i + 1))}{(7i + 1)(-7i + 1)} \\ &= \frac{-21i + 3 - 35i^2 + 5i}{49 + 1} \\ &= \frac{38 - 16i}{50} \\ &= \frac{19}{25} - \frac{8i}{25}, \end{aligned}$$

from which we obtain $\Re(z) = \frac{19}{25}$, $\Im(z) = -\frac{8}{25}$.

Problem 2 Find the conjugate and norm of the complex number

$$w = (2 + i)(4 + 3i)$$

Solution: Let's simplify this complex number by distributing the product,

$$\begin{aligned} w &= (2 + i)(4 + 3i) \\ &= 8 + 6i + 4i + 3i^2 \\ &= 8 + 10i - 3 \\ &= 5 + 10i. \end{aligned}$$

Its complex conjugate follows readily from this form,

$$\overline{w} = 5 - 10i.$$

The norm is

$$|w| = \sqrt{5^2 + 10^2} = 5\sqrt{5}.$$