

Complex Numbers Q15– Practice/Y1/E (22/5/21)

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Solution

(a) Let $(2 + 5i) \div (1 + 3i) = a + bi$

Then $2 + 5i = (a + bi)(1 + 3i) = a + 3ai + bi - 3b$

Equating real parts: $2 = a - 3b$ (1)

Equating imaginary parts: $5 = 3a + b$ (2)

$(1) + 3 \times (2) \Rightarrow 17 = 10a \Rightarrow a = \frac{17}{10}$

Then $(2) \Rightarrow b = 5 - \frac{51}{10} = -\frac{1}{10}$

So $(2 + 5i) \div (1 + 3i) = \frac{17}{10} - \frac{i}{10}$

(b) $\frac{2+5i}{1+3i} = \frac{(2+5i)(1-3i)}{(1+3i)(1-3i)} = \frac{2+15-6i+5i}{1+9} = \frac{17}{10} - \frac{i}{10}$

Check: $\frac{1}{10}(17 - i)(1 + 3i) = \frac{1}{10}(17 + 3 - i + 51i) = 2 + 5i$