

620-161 SOLUTIONS TO HOMEWORK SHEET 10
Semester 1 2007

Out of 12 - Parts 1, 2 and 3 each out of 4.

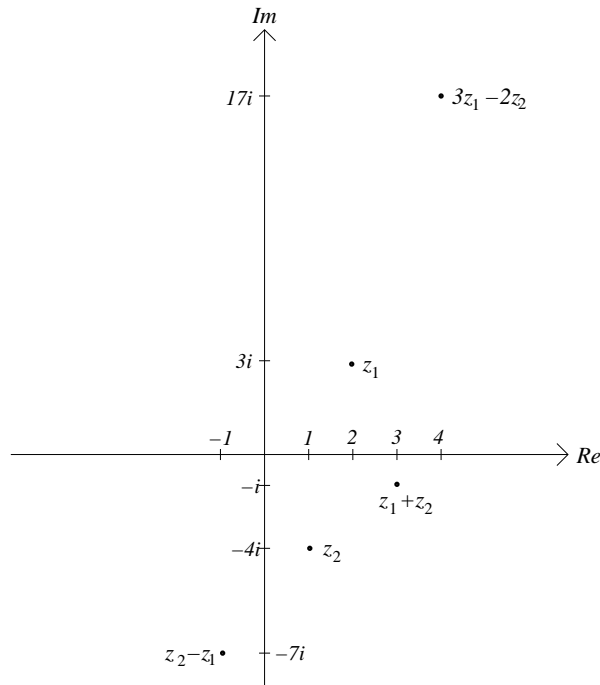
1. (a) We have $z_1 = 2 + 3i$ and $z_2 = 1 - 4i$.

(i) $z_1 + z_2 = (2 + 3i) + (1 - 4i) = 3 - i$

(ii) $z_2 - z_1 = (1 - 4i) - (2 + 3i) = -1 - 7i$

(ii) $3z_1 - 2z_2 = 3(2 + 3i) - 2(1 - 4i) = 6 + 9i - 2 + 8i = 4 + 17i$

(b)



2. (i) $\frac{2}{4+i} = \frac{2}{4+i} \times \frac{4-i}{4-i} = \frac{8-2i}{4^2-i^2} = \frac{8-2i}{16+1} = \frac{8}{17} - \frac{2}{17}i$

(ii) $\frac{2-3i}{3-2i} = \frac{2-3i}{3-2i} \times \frac{3+2i}{3+2i} = \frac{6+4i-9i+6}{3^2-(2i)^2} = \frac{12-5i}{9+4} = \frac{12}{13} - \frac{5}{13}i$

3. (i) $z^2 + 4z + 3 = 0 \Rightarrow (z+3)(z+1) = 0 \Rightarrow z = -3$ or $z = -1$.

(ii) $z^2 + 2z + 3 = 0$

$\Rightarrow z = \frac{-2 \pm \sqrt{2^2 - 4 \cdot 1 \cdot 3}}{2 \cdot 1} = \frac{-2 \pm \sqrt{-8}}{2} = \frac{-2 \pm 2\sqrt{2}i}{2} = -1 \pm \sqrt{2}i$.