2 Working with em

DONE

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① $z = x + iy$

The real part

The imaginary part (y)

$\therefore \operatorname{Re}(z) = x$

$\operatorname{Re}(z) = y$

② $\left(\frac{3}{7} + 5i\right) - \left(3 - \frac{4}{7}i\right)$

$= -\frac{18}{7} + \frac{39}{7}i$

③ $i = \sqrt{-1}$

$i^2 = -1$

$i^3 = -i$

$i^4 = -i^2 = 1$

$i^5 = i$

$i^6 = i^2 = -1$

$i^7 = -i$

$i, -1, -i, 1$

④ $(\sqrt{2} + i)(3 - \sqrt{2}i)(3\sqrt{2} - i)$

$= (\sqrt{2} + i)(9\sqrt{2} - 3i - 6i - \sqrt{2})$

$= (\sqrt{2} + i)(8\sqrt{2} - 9i)$

$= 16 - 9\sqrt{2}i + 8\sqrt{2}i + 9$

$= 25 - \sqrt{2}i$ //

⑤ $\frac{4 - i}{5 + 2i} \times \frac{5 - 2i}{5 - 2i}$

$= \frac{(4 - i)(5 - 2i)}{(5 + 2i)(5 - 2i)}$

$= \frac{20 - 8i - 5i + 2i^2}{25 - 4i^2}$

$= \frac{18 - 13i}{29} = \frac{18}{29} - \frac{13}{29}i$ //

⑥ $z^2 = -5 + 12i$

$\sqrt{-5 + 12i} = a + bi$

$-5 + 12i = (a + bi)^2 = z^2$

$a^2 + 2abi - b^2 = -5 + 12i$

$\Rightarrow a^2 - b^2 = -5$

$\Rightarrow 2abi = 12i$

R: $a^2 - b^2 = -5$

$a^2 - \left(\frac{6}{a}\right)^2 = -5$

$a^4 - 36 = -5a^2$

$a^4 + 5a^2 - 36 = 0$

$\therefore a^2 = 4$ or $a^2 = -9$

$\therefore a = \pm 2$ or $a = \pm 3i$

I: $2ab = 12$

$ab = 6$

$\therefore b = \frac{6}{a}$

$\therefore a = 2, -2, 3i, -3i$

$\therefore z = 2 + 3i$

$\therefore z = -2 - 3i$