

## § 1.8 複素数

### 問題 1.8.1

$$\alpha + \beta = -4 + 5i - 3 - 2i = -7 + 3i .$$

$$\alpha - \beta = -4 + 5i - (-3 - 2i) = -1 + 7i .$$

$$\alpha\beta = (-4 + 5i)(-3 - 2i) = 12 + 8i - 15i - 10i^2 = 12 - 7i + 10 = 22 - 7i .$$

### 問題 1.8.2

$$\frac{\alpha}{\beta} = \frac{3 - 2i}{-4 + 5i} = \frac{(3 - 2i)(-4 - 5i)}{(-4 + 5i)(-4 - 5i)} = \frac{-12 - 15i + 8i + 10i^2}{(-4)^2 - 5^2i^2} = \frac{-12 - 7i - 10}{16 + 25} = -\frac{22 + 7i}{41} .$$

$$\frac{\beta}{\alpha} = \frac{-4 + 5i}{3 - 2i} = \frac{(-4 + 5i)(3 + 2i)}{(3 - 2i)(3 + 2i)} = \frac{-12 - 8i + 15i + 10i^2}{3^2 - 2^2i^2} = \frac{-12 + 7i - 10}{9 + 4} = \frac{-22 + 7i}{13} .$$

### 問題 1.8.3

$$(3 - 2i)^3 = 3^3 - 3 \cdot 3^2 2i + 3 \cdot 3 \cdot (2i)^2 - (2i)^3 = 27 - 54i - 36 + 8i = -9 - 46i .$$