

演習問題 14

問題 1 解の公式を用いて次の 2 次方程式を解け。

$$(1) \quad x^2 + x + 1 = 0 \quad x = \frac{-1 \pm \sqrt{1-4}}{2} = \frac{-1 \pm \sqrt{3}i}{2}$$

$$(2) \quad 2x^2 - 5x + 4 = 0 \quad x = \frac{5 \pm \sqrt{25-32}}{4} = \frac{5 \pm \sqrt{7}i}{4}$$

$$(3) \quad 3x^2 - 7x + 5 = 0 \quad x = \frac{7 \pm \sqrt{49-60}}{6} = \frac{7 \pm \sqrt{11}i}{6}$$

$$(4) \quad -2x^2 + 6x - 7 = 0 \quad \text{両辺に } -1 \text{ を掛けると、} 2x^2 - 6x + 7 = 0 \quad \therefore x = \frac{3 \pm \sqrt{9-14}}{2} = \frac{3 \pm \sqrt{5}i}{2}$$

$$(5) \quad x^2 - 10x + 26 = 0 \quad x = 5 \pm \sqrt{25-26} = 5 \pm i$$

$$(6) \quad 7x^2 - 6x + 2 = 0 \quad x = \frac{3 \pm \sqrt{9-14}}{7} = \frac{3 \pm \sqrt{5}i}{7}$$

$$(7) \quad 9x^2 - 6\sqrt{2}x + 2 = 0 \quad x = \frac{3\sqrt{2} \pm \sqrt{18-18}}{9} = \frac{\sqrt{2}}{3}$$

問題 2 次の式を、複素数の範囲で因数分解せよ。

$$(1) \quad x^2 + 4x - 3 = (x+2)^2 - 7 = (x+2+\sqrt{7})(x+2-\sqrt{7})$$

$$(2) \quad 2x^2 - 2x + 3 \quad 2x^2 - 2x + 3 = 0 \text{ を解くと、} x = \frac{1 \pm \sqrt{5}i}{2}$$

$$\text{ゆえに、} 2x^2 - 2x + 3 = 2 \left(x - \frac{1 + \sqrt{5}i}{2} \right) \left(x - \frac{1 - \sqrt{5}i}{2} \right)$$

$$(3) \quad x^2 + 8x + 5 = (x+4)^2 - 11 = (x+4+\sqrt{11})(x+4-\sqrt{11})$$

$$(4) \quad 2x^2 + 3x + 2 \quad 2x^2 + 3x + 2 = 0 \text{ を解くと、} x = \frac{-3 \pm \sqrt{9-16}}{4} = \frac{-3 \pm \sqrt{7}i}{4}$$

$$\text{ゆえに、} 2x^2 + 3x + 2 = 2 \left(x - \frac{-3 + \sqrt{7}i}{4} \right) \left(x - \frac{-3 - \sqrt{7}i}{4} \right)$$

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