

$$\begin{array}{c} 1 \\ 1 \quad 1 \\ 1 \quad 2 \quad 1 \\ 1 \quad 3 \quad 3 \quad 1 \end{array}$$

1 復習

1.1 問題 1

以下の式を展開せよ。

(1) $(x+1)^3$

$$\begin{aligned} &= x^3 + 3 \cdot x^2 \cdot 1 + 3 \cdot x \cdot 1^2 + 1^3 \\ &= x^3 + 3x^2 + 3x + 1 \end{aligned}$$

(2) $(x-2)^3$

$$\begin{aligned} &= x^3 + 3 \cdot x^2 \cdot (-2) + 3 \cdot x \cdot (-2)^2 + (-2)^3 \\ &= x^3 - 6x^2 + 12x - 8 \end{aligned}$$

(3) $(2x+3y)^3$

$$\begin{aligned} &= (2x)^3 + 3 \cdot (2x)^2 \cdot 3y + 3 \cdot (2x) \cdot (3y)^2 + (3y)^3 \\ &= 8x^3 + 36x^2y + 54xy^2 + 27y^3 \end{aligned}$$

(4) $(x+y)(x^2-xy+y^2)$

$$= x^3 + y^3$$

(5) $(x-2)(x^2+2x+4)$

$$= x^3 - 8$$

(6) $(3x+2y)(9x^2-6xy+4y^2)$

$$= 27x^3 + 8y^3$$

1.2 問題 2

以下の式を因数分解せよ.

(1) $x^3 - 1$

$$= \underline{(x-1)(x^2+x+1)}$$

(2) $x^3 + 8$

$$= \underline{(x+2)(x^2-2x+4)}$$

(3) $125x^3 - 27y^3$

$$= \underline{(5x-3y)(25x^2+15xy+9y^2)}$$

(4) $x^6 - y^6$

$$\begin{aligned} &= (x^3)^2 - (y^3)^2 \\ &= (x^3 - y^3)(x^3 + y^3) \\ &= (x-y)(x^2+xy+y^2)(x+y)(x^2-xy+y^2) \end{aligned}$$

(5) $x^6 - 64$

$$\begin{aligned} &= x^6 - 2^6 \\ &= (x^3)^2 - (2^3)^2 \\ &= (x^3 - 2^3)(x^3 + 2^3) \\ &= (x-2)(x^2+2x+4)(x+2)(x^2-2x+4) \end{aligned}$$

(6) $x^6 + 7x^3 - 8$

$A = x^3$ とおく.

$$\begin{aligned} &= A^2 + 7A - 8 \\ &= (A-1)(A+8) \\ &= (x^3-1)(x^3+8) \\ &= \underline{(x-1)(x^2+x+1)(x+2)(x^2-2x+4)} \end{aligned}$$