

P. 4

$$\begin{aligned} \text{[1]} \quad (1) \quad (a+3)^3 \\ = a^3 + 3 \cdot a^2 \cdot 3 + 3 \cdot a \cdot 3^2 + 3^3 \\ = a^3 + 9a^2 + 27a + 27 \end{aligned}$$

$$\begin{aligned} (3) \quad (2x-1)^3 \\ = (2x)^3 + 3 \cdot (2x)^2 \cdot (-1) + 3 \cdot 2x \cdot (-1)^2 + (-1)^3 \\ = 8x^3 - 12x^2 + 6x - 1 \end{aligned}$$

$$\begin{aligned} (5) \quad (3x+2y)^3 \\ = (3x)^3 + 3 \cdot (3x)^2 \cdot 2y + 3 \cdot 3x \cdot (2y)^2 + (2y)^3 \\ = 27x^3 + 54x^2y + 36xy^2 + 8y^3 \end{aligned}$$

$$\begin{aligned} \text{[2]} \quad (1) \quad (x+4)(x^2-4x+16) \\ = x^3 - 4x^2 + 16x \\ \quad + 4x^2 - 16x + 64 \\ = x^3 + 64 \end{aligned}$$

$$\begin{aligned} (3) \quad (x-4y)(x^2+4xy+16y^2) \\ = x^3 + 4x^2y + 16xy^2 \\ \quad - 4x^2y - 16xy^2 - 64y^3 \\ = x^3 - 64y^3 \end{aligned}$$

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

$$\begin{aligned} (4) \quad (x+4y)^3 \\ = x^3 + 3 \cdot x^2 \cdot 4y + 3 \cdot x \cdot (4y)^2 + (4y)^3 \\ = x^3 + 12x^2y + 48xy^2 + 64y^3 \end{aligned}$$

$$\begin{aligned} (6) \quad (-2a+b)^3 \\ = (-2a)^3 + 3 \cdot (-2a)^2 \cdot b + 3 \cdot (-2a) \cdot b^2 + b^3 \\ = -8a^3 + 12a^2b - 6ab^2 + b^3 \end{aligned}$$

$$\begin{aligned} (2) \quad (a-2)(a^2+2a+4) \\ = a^3 + 2a^2 - 4a \\ \quad - 2a^2 - 4a - 8 \\ = a^3 - 8 \end{aligned}$$

$$\begin{aligned} (4) \quad (3x+5y)(9x^2-15xy+25y^2) \\ = 27x^3 + 125y^3 \end{aligned}$$

[3]

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

$$\begin{aligned}
 (2) \quad a^3 - 125 \\
 &= a^3 - 5^3 \\
 &= (a-5)(a^2+5a+25)
 \end{aligned}$$

$$\begin{aligned}
 (3) \quad 8x^3 + 27 \\
 &= (2x)^3 + 3^3 \\
 &= (2x+3)(4x^2-6x+9)
 \end{aligned}$$

$$\begin{aligned}
 (4) \quad 64a^3 - 27b^3 \\
 &= (4a)^3 - (3b)^3 \\
 &= (4a-3b)(16a^2+12ab+9b^2)
 \end{aligned}$$

$$\begin{aligned}
 (5) \quad \frac{1}{27} + x^3 \\
 &= \left(\frac{1}{3}\right)^3 + x^3 \\
 &= \left(\frac{1}{3} + x\right)\left(\frac{1}{9} - \frac{1}{3}x + x^2\right)
 \end{aligned}$$

$$\begin{aligned}
 (6) \quad x^3 - y^3z^3 \\
 &= (x-yz)(x^2+xyz+y^2z^2)
 \end{aligned}$$

[4]

$$\begin{aligned}
 (1) \quad 64x^6 - 1 \\
 &= (8x^3)^2 - 1^2 \\
 &= (8x^3+1)(8x^3-1) \\
 &= \left\{ (2x)^3 + 1^3 \right\} \left\{ (2x)^3 - 1^3 \right\} \\
 &= (2x+1)(4x^2-2x+1)(2x-1)(4x^2+2x+1)
 \end{aligned}$$

$$\begin{aligned}
 (2) \quad 1 - a^6 \\
 &= 1 - (a^3)^2 \\
 &= (1+a^3)(1-a^3) \\
 &= (1+a)(1-a+a^2)(1-a)(1+a+a^2)
 \end{aligned}$$

P7

(16)

$$\text{元式} = (\text{割り数}) \times \text{商} + \text{余り}$$

$$(1) A = (2x+1)(x^2-3x-2) + 4$$

$$= 2x^3 - 5x^2 - 7x + 2$$

$$(2) A = (x^2-2x-1)(2x-3) - 2x+3$$

$$= 2x^3 - 7x^2 + 6x + 3 - 2x + 3$$

$$= 2x^3 - 7x^2 + 4x + 6$$

$$(3) x^3 + x^2 - 3x - 1 = B(x-1) - 3x + 1$$

$$x^3 + x^2 - 2 = B(x-1)$$

$$(x-1)B = x^3 + x^2 - 2$$

「B =」の形にするには
両辺に $(x-1)$ を割り3

$$\begin{array}{r} x^2 + 2x + 2 \\ x-1 \overline{) x^3 + x^2 - 2} \\ \underline{x^3 - x^2} \\ 2x^2 + 0 \\ \underline{2x^2 - 2x} \\ 2x - 2 \\ \underline{2x - 2} \\ 0 \end{array}$$

$$\therefore B = x^2 + 2x + 2$$

$$(4) 6x^3 + 11x^2 - 2 = B(2x^2 + 3x - 1) - 1$$

$$6x^3 + 11x^2 - 1 = B(2x^2 + 3x - 1)$$

$$\begin{array}{r} 3x + 1 \\ 2x^2 + 3x - 1 \overline{) 6x^3 + 11x^2 - 1} \\ \underline{6x^3 + 9x^2 - 3x} \\ 2x^2 + 3x - 1 \\ \underline{2x^2 + 3x - 1} \\ 0 \end{array}$$

$$\therefore B = 3x + 1$$

P7.

(15)

$$(1) A = x^2 + 5x + 6$$

$$B = x + 1$$

$$\begin{array}{r} x+1 \overline{) x^2 + 5x + 6} \\ \underline{x^2 + x} \\ 4x + 6 \end{array} \quad \downarrow \text{下へ.}$$

常に1で何次式がそろえる
意識を!

$$\begin{array}{r} x+1 \overline{) x^2 + 5x + 6} \\ \underline{x^2 + x} \\ 4x + 6 \\ \underline{4x + 4} \\ 2 \end{array}$$

ここがそろえるように
考えて□に入める。

∴ 商 $x+4$ 余り 2.

$$(2) A = 2x^3 - x^2 - 2x - 8$$

$$B = x - 2$$

$$\begin{array}{r} 2x^2 + x \\ x-2 \overline{) 2x^3 - x^2 - 2x - 8} \\ \underline{2x^3 - 2x^2} \\ x^2 - 2x \\ \underline{x^2 - 2x} \\ -8 \end{array}$$

商 $2x^2 + x$

余り -8.

$$(4) A = 4x^3 - 6x^2 - 5$$

$$B = 2x^2 + 1$$

$$\begin{array}{r} 2x - 3 \\ 2x^2 + 1 \overline{) 4x^3 - 6x^2 - 5} \\ \underline{4x^3 + 2x} \\ -6x^2 - 2x - 5 \\ \underline{-6x^2 - 3} \\ -2x - 2. \end{array}$$

$$(3) A = x^3 + 2x^2 + x$$

$$B = x^2 + x - 3$$

$$\begin{array}{r} x+1 \\ x^2+x-3 \overline{) x^3 + 2x^2 + x + 0} \\ \underline{x^3 + x^2 - 3x} \\ x^2 + 4x. \\ \underline{x^2 + x - 3} \\ 3x + 3. \end{array}$$

忘れずに.

$$(5) A = 1 - 2a + 4a^3 + 10a^2$$

$$= 4a^3 + 10a^2 - 2a + 1$$

$$B = 1 + 2a = 2a + 1$$

$$\begin{array}{r} 2a^2 + 4a - 3 \\ 2a+1 \overline{) 4a^3 + 10a^2 - 2a + 1} \\ \underline{4a^3 + 2a^2} \\ 8a^2 - 2a \\ \underline{8a^2 + 4a} \\ -6a + 1 \\ \underline{-6a - 3} \\ 4 \end{array}$$

P 8.

[18].

(18).
$$(1) \frac{6xy^4}{3x^2y^3} = \frac{2y}{x}$$

$$(2) \frac{8a^2x^3y}{40a^2x^2y^2} = \frac{2x}{5y}$$

$$(3) \frac{3x^2 - 9x - 30}{3x^2 - 15x}$$

$$(4) \frac{x^2 - 3x - 4}{2x^2 + 3x + 1} = \frac{(x-4)(x+1)}{(2x+1)(x+1)}$$

$$= \frac{3(x^2 - 3x - 10)}{3x(x - 5)}$$

$$= \frac{x-4}{2x+1}$$

$$= \frac{3(x-5)(x+2)}{3x(x-5)}$$

$$(5) \frac{2x^2 - 3x - 2}{x^2 - 5x + 6} = \frac{(2x+1)(x-2)}{(x-2)(x-3)}$$

$$r = \frac{x+2}{x}$$

$$2 \frac{2x+1}{x-3}$$

$$(6) \frac{x^3 - 1}{x^2 + x - 2} = \frac{(x-1)(x^2 + x + 1)}{(x+2)(x-1)} = \frac{x^2 + x + 1}{x+2}$$

Point

[illegible]

$\frac{A+C}{A+B}$ では約分不可. $\frac{AC}{AB}$ は約分可.

$$\frac{AD}{AB+AC} = \frac{AD}{A(B+C)} = \frac{D}{B+C}$$

解法四：由母函数

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$$(1) \frac{x^2 - 11x + 30}{x^3 - 6x^2 + 9x} \times \frac{x^2 - 3x}{x - 5}$$

$$= \frac{(x-5)(x-6)}{x(x^2 - 6x + 9)} \times \frac{x(x-3)}{x-5}$$

$$= \frac{x-6}{(x-3)^2} \times (x-3)$$

$$= \frac{x-6}{x-3}$$

$$(3) \frac{x^2 + 5x}{x+3} \times \frac{2x^2 + 5x - 3}{2x^2 - x}$$

$$= \frac{x(x+5)}{x+3} \times \frac{(2x-1)(x+3)}{x(2x-1)}$$

$$= x+5$$

$$(5) \frac{a^3 + b^3}{a^3 - b^3} \div \frac{(a+b)^2}{a^2 - b^2}$$

$$= \frac{(a+b)(a^2 - ab + b^2)}{(a-b)(a^2 + ab + b^2)} \times \frac{(a+b)(a-b)}{(a+b)^2}$$

$$= \frac{a^2 - ab + b^2}{a^2 + ab + b^2}$$

$$(2) \frac{x^2 + x - 6}{x^2 - 4x + 4} \times \frac{x^2 + 2x - 8}{x^2 - x - 12}$$

$$= \frac{(x+3)(x-2)}{(x-2)^2} \times \frac{(x+4)(x-2)}{(x-4)(x+3)}$$

$$= \frac{x+4}{x-4}$$

$$(4) \frac{4a^2 - b^2}{a^2 - 4b^2} \div \frac{2a+b}{a-2b}$$

$$= \frac{(2a+b)(2a-b)}{(a+2b)(a-2b)} \times \frac{a-2b}{2a+b}$$

$$= \frac{2a-b}{a+2b}$$

÷ して × に
かえて
うしろの数を
逆数に。
↑
分母と分子を
入れかえる。

$$(6) \frac{x^2 - 3xy + 2y^2}{x^3 - y^3} \div \frac{x^2 - xy - 2y^2}{x^3 + x^2y + xy^2}$$

$$= \frac{(x-y)(x-2y)}{(x-y)(x^2 + xy + y^2)} \times \frac{x(x^2 + x^2y + y^2)}{(x-2y)(x+y)}$$

$$= \frac{x}{x+y}$$

(20)

$$(1) \frac{2x}{x+1} - \frac{x}{x+1}$$

$$= \frac{x}{x+1}$$

$$(2) \frac{x}{x^2-y^2} + \frac{y}{x^2-y^2}$$

$$= \frac{x+y}{x^2-y^2} = \frac{x+y}{(x+y)(x-y)}$$

$$(3) \frac{x^2+4}{x-2} - \frac{4x}{x-2}$$

$$= \frac{x^2-4x+4}{x-2}$$

$$= \frac{(x-2)^2}{x-2}$$

$$= x-2$$

$$(4) \frac{x^2}{x-3} + \frac{9}{3-x}$$

$$= \frac{x^2}{x-3} - \frac{9}{x-3}$$

$$= \frac{x^2-9}{x-3} = \frac{(x+3)(x-3)}{x-3} = x+3$$

Point

・分数のたし算・ひき算は分母をそろえる！

・分母がそろったら分子のみを計算

・分母・分子が因数分解できないか確認

・約分ができればやる

(21)

$$\begin{aligned}(1) \quad & \frac{2}{x+1} + \frac{3}{x-1} \\&= \frac{2(x-1)}{(x+1)(x-1)} + \frac{3(x+1)}{(x+1)(x-1)} \\&= \frac{5x+1}{(x+1)(x-1)}\end{aligned}$$

(3) ※ 個人解にはこのやり方もある

$$\begin{aligned}& \frac{4}{x^2-4} - \frac{5}{x^2-x-6} \\&= \frac{4}{(x+2)(x-2)} - \frac{5}{(x-3)(x+2)} \\&= \frac{4(x-3) - 5(x-2)}{(x-2)(x+2)(x-3)} \\&= \frac{-x-2}{(x-2)(x+2)(x-3)} \\&= \frac{-(x+2)}{(x-2)(x+2)(x-3)} \\&= \frac{-1}{(x-2)(x-3)}\end{aligned}$$

$$\begin{aligned}(2) \quad & \frac{1}{x^2-9} - \frac{3}{x^2+3x} \\&= \frac{1}{(x+3)(x-3)} - \frac{3}{x(x+3)} \\&= \frac{x}{x(x+3)(x-3)} - \frac{3(x-3)}{x(x+3)(x-3)} \\&= \frac{x-3(x-3)}{x(x+3)(x-3)} \\&= \frac{-2x+9}{x(x+3)(x-3)}\end{aligned}$$