

P. 6 19

(1) $\underline{x^2} - \underline{xy} - \underline{12y^2} + \underline{5x} + y + 6$

$= x^2 + (-y+5)x - 12y^2 + y + 6$

$= x^2 + (-y+5)x + (3y+2)(-4y+3)$

$= (x+3y+2)(x-4y+3)$

①

$$\begin{array}{r} 3 \times 2 \rightarrow -6 \\ -4 \times 3 \rightarrow 12 \\ \hline 1 \end{array}$$

②

$$\begin{array}{r} 1 \times 3y+2 \rightarrow 3y+2 \\ 1 \times -4y+3 \rightarrow -4y+3 \\ \hline -y+5 \end{array}$$

(2) $\underline{x^2} + \underline{3xy} + \underline{2y^2} + \underline{4x} + 5y + 3$

$= x^2 + (3y+4)x + 2y^2 + 5y + 3$

$= x^2 + (3y+4)x + (2y+3)(y+1)$

$= (x+2y+3)(x+y+1)$

①

$$\begin{array}{r} 2 \times 3 \rightarrow 6 \\ 1 \times 1 \rightarrow 1 \\ \hline 5 \end{array}$$

②

$$\begin{array}{r} 1 \times 2y+3 \rightarrow 2y+3 \\ 1 \times y+1 \rightarrow y+1 \\ \hline 3y+4 \end{array}$$

(3) $\underline{2x^2} + \underline{5xy} + \underline{3y^2} + \underline{2x} + 4y - 4$

$= 2x^2 + (5y+2)x + 3y^2 + 4y - 4$

$= 2x^2 + (5y+2)x + (3y-2)(y+2)$

$= (2x+3y-2)(x+y+2)$

①

$$\begin{array}{r} 3 \times -2 \rightarrow -6 \\ 1 \times 2 \rightarrow 2 \\ \hline -4 \end{array}$$

②

$$\begin{array}{r} 2 \times 3y-2 \rightarrow 6y-4 \\ 1 \times y+2 \rightarrow y+2 \\ \hline 5y+2 \end{array}$$

(4) $\underline{6x^2} - \underline{5xy} - \underline{6y^2} + \underline{4x} + 7y - 2$

$= 6x^2 + (-5y+4)x - 6y^2 + 7y - 2$

$= 6x^2 + (-5y+4)x + (-2y+1)(3y-2)$

$= (3x+2y-1)(2x-3y+2)$

①

$$\begin{array}{r} -2 \times 1 \rightarrow -2 \\ 3 \times -2 \rightarrow -6 \\ \hline -8 \end{array}$$

②

$$\begin{array}{r} 3 \times -(-2y+1) \rightarrow 6y-3 \\ 2 \times -(3y-2) \rightarrow -6y+4 \\ \hline -y+1 \end{array}$$

$-5y+4$

P. 7 [2]

$$(1) x^4 + 64$$

$$\begin{aligned}
 &= x^4 + \underbrace{16x^2 + 64 - 16x^2}_{\text{add 0}} \\
 &= (x^2 + 8)^2 - (4x)^2 \\
 &= (x^2 + 8 + 4x)(x^2 + 8 - 4x) \\
 &= (x^2 + 4x + 8)(x^2 - 4x + 8)
 \end{aligned}$$

$$(3) 4x^4 + y^4$$

$$\begin{aligned}
 &= 4x^4 + \underbrace{4x^2y^2 + y^4 - 4x^2y^2}_{\text{add 0}} \\
 &= (2x^2 + y^2)^2 - (2xy)^2 \\
 &= (2x^2 + y^2 + 2xy)(2x^2 + y^2 - 2xy) \\
 &= (2x^2 + 2xy + y^2)(2x^2 - 2xy + y^2)
 \end{aligned}$$

$$(5) a^4 - 3a^2 + 9$$

$$\begin{aligned}
 &\quad \downarrow + 9a^2 \\
 &= a^4 + \underbrace{6a^2 + 9 - 9a^2}_{\text{add 0}} \\
 &= (a^2 + 3)^2 - (3a)^2 \\
 &= (a^2 + 3 + 3a)(a^2 + 3 - 3a) \\
 &= (a^2 + 3a + 3)(a^2 - 3a + 3)
 \end{aligned}$$

$$(2) x^4 + x^2 + 1$$

$$\begin{aligned}
 &= x^4 + \underbrace{2x^2 + 1 - x^2}_{\text{add 0}} \\
 &= (x^2 + 1)^2 - x^2 \\
 &= (x^2 + 1 + x)(x^2 + 1 - x) \\
 &= (x^2 + x + 1)(x^2 - x + 1)
 \end{aligned}$$

$$(4) a^4 + a^2b^2 + 25b^4$$

$$\begin{aligned}
 &\quad \downarrow + 9a^2b^2 \\
 &= a^4 + \underbrace{10a^2b^2 + 25b^4 - 9a^2b^2}_{\text{add 0}} \\
 &= (a^2 + 5b^2)^2 - (3ab)^2 \\
 &= (a^2 + 5b^2 + 3ab)(a^2 + 5b^2 - 3ab) \\
 &= (a^2 + 3ab + 5b^2)(a^2 - 3ab + 5b^2)
 \end{aligned}$$

$$(6) a^4 - 12a^2b^2 + 144b^4$$

$$\begin{aligned}
 &\quad \downarrow + 36a^2b^2 \\
 &= a^4 + \underbrace{24a^2b^2 + 144b^4 - 36a^2b^2}_{\text{add 0}} \\
 &= (a^2 + 12b^2)^2 - (6ab)^2 \\
 &= (a^2 + 12b^2 + 6ab)(a^2 + 12b^2 - 6ab) \\
 &= (a^2 + 6ab + 12b^2)(a^2 - 6ab + 12b^2)
 \end{aligned}$$