

3 以下の問いに実数範囲で答えよ。【\*\*】

(1)  $x^2 - 3x - y^2 - y + 2$  を因数分解せよ.

$$\begin{aligned}
 &= x^2 - 3x - (y^2 + y - 2) \\
 &= x^2 - 3x - (y-1)(y+2) \\
 &= \{x + (y-1)\} \{x - (y+2)\} \\
 &= \underline{(x+y-1)(x-y-2)}
 \end{aligned}$$

(2)  $x^2 + xy - 2y^2 - 4x + y + 3$  を因数分解せよ.

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

(3)  $bc(b-c) + ca(c-a) + ab(a-b)$  を因数分解せよ.

$$\begin{aligned}
 &b^2c - bc^2 + c^2a - a^2c + a^2b - ab^2 \\
 &= (b-c)a^2 - (b^2-c^2)a + bc(b-c) \\
 &= (b-c)a^2 - (b-c)(b+c)a + bc(b-c) \\
 &= (b-c) \{a^2 - (b+c)a + bc\} \\
 &= \underline{(b-c)(a-b)(a-c)}
 \end{aligned}$$

(4)  $x^4 - x^2 - 12$  を因数分解せよ.

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

(5)  $(x+1)(x+2)(x+3)(x+4) - 48$  を因数分解せよ.

$$\begin{aligned}
 &= (x+1)(x+4) \times (x+2)(x+3) - 48 \\
 &= (x^2 + 5x + 4)(x^2 + 5x + 6) - 48 \\
 &= (x^2 + 5x)^2 + 10(x^2 + 5x) + 24 - 48 \\
 &= (x^2 + 5x)^2 + 10(x^2 + 5x) - 24 \\
 &= \{(x^2 + 5x) + 12\} \{(x^2 + 5x) - 2\} \\
 &= (x^2 + 5x + 12)(x^2 + 5x - 2) \\
 &= (x^2 + 5x + 12) \left(x - \frac{-5+\sqrt{33}}{2}\right) \left(x - \frac{-5-\sqrt{33}}{2}\right) \\
 &= \underline{(x^2 + 5x + 12) \left(x + \frac{5-\sqrt{33}}{2}\right) \left(x + \frac{5+\sqrt{33}}{2}\right)}
 \end{aligned}$$

(6)  $a^4 - b^4 - a^2 + b^2$  を因数分解せよ.

$$\begin{aligned}
 &= (a^2 - b^2)(a^2 + b^2) - (a^2 - b^2) \\
 &= (a^2 - b^2)(a^2 + b^2 - 1) \\
 &= \underline{(a+b)(a-b)(a^2 + b^2 - 1)}
 \end{aligned}$$