

因数分解 石川県私立高校入試問題の中から 1 解答編

I. 次の式を因数分解せよ。

①【尾山台85】

$$x^2 - 5x + 4 \\ = (x - 1)(x - 4)$$

②【短大高82】

$$x^2 - 2xy - 3y^2 \\ = (x + y)(x - 3y)$$

③【金沢89】

$$30 - 16x + 2x^2 \\ = 2x^2 - 16x + 30 \\ = 2(x^2 - 8x + 15) \\ = 2(x - 3)(x - 5)$$

④【尾山台90】

$$3x^2 + 6x - 9 \\ = 3(x^2 + 2x - 3) \\ = 3(x + 3)(x - 1)$$

⑤【北陸学院85】

$$2a^2 - 7a \\ = 2(a^2 - 3a) \\ = 2(a + 6)(a - 6)$$

⑥【北陸学院89】

$$ax^2 - ay^2 \\ = a(x^2 - y^2) \\ = a(x + y)(x - y)$$

⑦【北陸大谷92】

$$(x + 3)(x + 4) - 6 \\ = x^2 + 7x + 12 - 6 \\ = x^2 + 7x + 6 \\ = (x + 1)(x + 6)$$

⑧【金沢82】

$$(a + 5)^2 - 4 \\ = (a + 5)^2 - 2^2 \\ = (a + 5 + 2)(a + 5 - 2) \\ = (a + 7)(a + 3)$$

⑨【金沢高専82】

$$x^3 + x^2 - 6x \\ = x(x^2 + x - 6) \\ = x(x + 3)(x - 2)$$

⑩【短大高85】

$$a(x + 1) - (x + 1) \\ x + 1 = A \text{ とおく} \\ (\text{与式}) = aA - A \\ = A(a - 1) \\ = (x + 1)(a - 1)$$

⑪【北陸学院82】

$$(x - 3)^2 + (x - 3) - 2 \\ \text{【かんづめ方式】} \\ x - 3 = X \text{ とおく} \\ (\text{与式}) = X^2 + X - 2 \\ = (X + 2)(X - 1) \\ = (x - 3 + 2)(x - 3 - 1) \\ = (x - 1)(x - 4) \\ \text{【一度展開する方法】} \\ (\text{与式}) \\ = x^2 - 6x + 9 + x - 3 - 2 \\ = x^2 - 5x + 4 \\ = (x - 1)(x - 4)$$

⑫【星稜85】

$$(x + 2)^2 + 3(x + 2) + 2 \\ \text{【かんづめ方式】} \\ x + 2 = X \text{ とおく} \\ (\text{与式}) = X^2 + 3X + 2 \\ = (X + 1)(X + 2) \\ = (x + 2 + 1)(x + 2 + 2) \\ = (x + 3)(x + 4) \\ \text{【一度展開する方法】} \\ (\text{与式}) \\ = x^2 + 4x + 4 + 3x + 6 + 2 \\ = x^2 + 7x + 12 \\ = (x + 3)(x + 4)$$

⑬【星稜86】

$$2(x - 2)^2 - (x - 5)(x - 2) \\ \text{【かんづめ方式】} \\ x - 2 = X \text{ とおく} \\ (\text{与式}) = 2X^2 - (x - 5)X \\ = X(2X - (x - 5)) \\ = (x - 2)(2(x - 2) - (x - 5)) \\ = (x - 2)(2x - 4 - x + 5) \\ = (x - 2)(x + 1) \\ \text{【一度展開する方法】} \\ (\text{与式}) \\ = 2(x^2 - 4x + 4) \\ \quad - (x^2 - 7x + 10) \\ = 2x^2 - 8x + 8 - x^2 + 7x - 10 \\ = x^2 - x - 2 \\ = (x - 2)(x + 1)$$

⑭【短大高86】

$$(x + 2)(x - 3) - 2(x - 3) \\ \text{【かんづめ方式】} \\ x - 3 = X \text{ とおく} \\ (\text{与式}) = (x + 2)X - 2X \\ = X(x + 2 - 2) \\ = (x - 3)x \\ \text{【一度展開する方法】} \\ (\text{与式}) = x^2 - x - 6 - 2x + 6 \\ = x^2 - 3x \\ = x(x - 3)$$

⑮【尾山台88】

$$(x - 2)^2 - (x - 2) - 1 \\ \text{【かんづめ方式】} \\ x - 2 = X \text{ とおく} \\ (\text{与式}) = X^2 - X - 1 \\ = (X - 4)(X + 3) \\ = (x - 2 - 4)(x - 2 + 3) \\ = (x - 6)(x + 1) \\ \text{【一度展開する方法】} \\ (\text{与式}) \\ = x^2 - 4x + 4 - x + 2 - 1 \\ = x^2 - 5x + 6 \\ = (x - 6)(x + 1)$$

⑯【北陸学院85】

$$(x - 1)^2 - (x - 1) - 1 \\ \text{【かんづめ方式】} \\ x - 1 = X \text{ とおく} \\ (\text{与式}) = X^2 - X - 1 \\ = (X - 4)(X + 3) \\ = (x - 1 - 4)(x - 1 + 3) \\ = (x - 5)(x + 2) \\ \text{【一度展開する方法】} \\ (\text{与式}) \\ = x^2 - 2x + 1 - x + 1 - 1 \\ = x^2 - 3x + 1 \\ = (x - 5)(x + 2)$$

⑰【金沢92】

$$(x - y)^2 + 2(y - x) - 3 \\ x - y = X \text{ とおく} \\ (\text{与式}) \\ = (x - y)^2 - 2(x - y) - 3 \\ = X^2 - 2X - 3 \\ = (X - 3)(X + 1) \\ = (x - y - 3)(x - y + 1)$$

⑱【金沢86】

$$x^2 - (y + 1)^2 \\ = (x + (y + 1))(x - (y + 1)) \\ = (x + y + 1)(x - y - 1)$$

⑲【金沢高専88】

$$(x - y)^2 - x + y \\ = (x - y)^2 - (x - y) \\ x - y = A \text{ とおく} \\ (\text{与式}) = A^2 - A \\ = A(A - 1) \\ = (x - y)(x - y - 1)$$

⑳【金沢88】

$$x^2 - y^2 - x + y \\ = x^2 - y^2 - (x - y) \\ = (x + y)(x - y) - (x - y) \\ = (x - y)(x + y - 1)$$

II. 次の式を因数分解せよ。

①【北陸学院90】

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

②【金城88】

$$(x-3)^2 + 5x - 15$$

【びんづめ方式】

(与式)

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

【一度展開する方法】

(与式)

$$\begin{aligned} &= x^2 - 6x + 9 + 5x - 15 \\ &= x^2 - x - 6 \\ &= (x-3)(x+2) \end{aligned}$$

③【北陸学院88】

$$(x+2)^2 + 2(x+2) - 48$$

$$x+2 = X \text{ とおく}$$

$$\text{(与式)} = X^2 + 2X - 48$$

$$\begin{aligned} &= (X+8)(X-6) \\ &= (x+2+8)(x+2-6) \\ &= (x+10)(x-4) \end{aligned}$$

④【北陸学院93】

$$(x-2)^2 - (x-2) - 20$$

$$x-2 = X \text{ とおく}$$

$$\text{(与式)} = X^2 - X - 20$$

$$\begin{aligned} &= (X+4)(X-5) \\ &= (x-2+4)(x-2-5) \\ &= (x+2)(x-7) \end{aligned}$$

⑤【尾山台92】

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

⑥【北陸学院92】

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

⑦【星稜94】

$$\begin{aligned} & (x+3)^2 - 3(x+3) + 2 \\ & x+3 = X \text{ とおく} \\ \text{(与式)} &= X^2 - 3X + 2 \\ &= (X-1)(X-2) \\ &= (x+3-1)(x+3-2) \\ &= (x+2)(x+1) \end{aligned}$$

⑧【尾山台94】

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

⑨【金沢東94】

$$\begin{aligned} & (a+b)x - (a+b)(y+z) \\ &= (a+b)(x-(y+z)) \\ &= (a+b)(x-y-z) \end{aligned}$$

⑩【尾山台2015】

$$\begin{aligned} & (2x+1)(2x-1) \\ & \quad - 3(x-1)^2 - 12 \\ &= 4x^2 - 1 \\ & \quad - 3(x^2 - 2x + 1) - 12 \\ &= 4x^2 - 1 \\ & \quad - 3x^2 + 6x - 3 - 12 \\ &= x^2 + 6x - 16 \\ &= (x-2)(x+8) \end{aligned}$$

⑪【金沢2016】

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

⑫【金沢2015】

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

⑬【星稜2016】

$$\begin{aligned} & (x+1)^2 - 5(x+1) - 6 \\ & x+1 = X \text{ とおく} \\ \text{(与式)} &= X^2 - 5X - 6 \\ &= (X-6)(X+1) \\ &= (x+1-6)(x+1+1) \\ &= (x-5)(x+2) \end{aligned}$$

一度すべて展開するもよし

⑭【星稜2015】

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

⑮【北陸学院2016】

$$\begin{aligned} & (x-2)^2 + 5(x-2) - 6 \\ & x-2 = X \text{ とおく} \\ \text{(与式)} &= X^2 + 5X - 6 \\ &= (X+6)(X-1) \\ &= (x-2+6)(x-2-1) \\ &= (x+4)(x-3) \end{aligned}$$

一度すべて展開するもよし

⑯【遊学館2015】

$$\begin{aligned} & x^2 - 5x - 24 \\ &= (x-8)(x+3) \end{aligned}$$

⑰【遊学館2016】

$$\begin{aligned} & x^2 + 3x - 28 \\ &= (x+7)(x-4) \end{aligned}$$

⑱【金沢工業高専2016】

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

⑲【金沢学院2016】

$$\begin{aligned} & xy^2 - 9x \\ &= x(y^2 - 9) \\ &= x(y+3)(y-3) \end{aligned}$$