

1 因数分解/2次式

次の式を因数分解せよ.

- (1) $x^2 - 16 = \underline{\underline{(x - 4)(x + 4)}}$
- (2) $x^2 - 1 = \underline{\underline{(x + 1)(x - 1)}}$
- (3) $9x^2 - 25 = \underline{\underline{(3x + 5)(3x - 5)}}$
- (4) $x^2 - 18x + 81 = \underline{\underline{(x - 9)^2}}$
- (5) $9x^2 - 30xy + 25y^2 = \underline{\underline{(3x - 5y)^2}}$
- (6) $4x^2 - 12x + 9 = \underline{\underline{(2x - 3)^2}}$
- (7) $x^2 + 7x + 10 = \underline{\underline{(x + 5)(x + 2)}}$
- (8) $x^2 - 5xy + 6y^2 = \underline{\underline{(x - 3y)(x - 2y)}}$
- (9) $x^2 - 7xy + 12y^2 = \underline{\underline{(x - 4y)(x - 3y)}}$
- (10) $2x^2 + 20x + 42 = \underline{\underline{2(x + 3)(x + 7)}}$
- (11) $2x^2 - 14x + 20 = \underline{\underline{2(x - 2)(x - 5)}}$
- (12) $-4x^2 + 48x - 140 = \underline{\underline{-4(x - 5)(x - 7)}}$
- (13) $-2ab^2 - 28ab - 98a = \underline{\underline{-2a(b + 7)^2}}$
- (14) $3ab^2 - 27a = \underline{\underline{3a(b - 3)(b + 3)}}$
- (15) $-4y^2 + 16y + 180 = \underline{\underline{-4(y + 5)(y - 9)}}$

2 因数分解/3次式

次の式を因数分解せよ.

- (1) $64a^3 - b^3 = \underline{\underline{(4a - b)(16a^2 + 4ab + b^2)}}$
- (2) $x^3 + 64 = \underline{\underline{(x + 4)(x^2 - 4x + 16)}}$
- (3) $64a^3 + 27b^3 = \underline{\underline{(4a + 3b)(16a^2 - 12ab + 9b^2)}}$
- (4) $x^3 - 8 = \underline{\underline{(x - 2)(x^2 + 2x + 4)}}$
- (5) $8x^3 + y^3 = \underline{\underline{(2x + y)(4x^2 - 2xy + y^2)}}$
- (6) $x^3 + 27 = \underline{\underline{(x + 3)(x^2 - 3x + 9)}}$
- (7) $8x^3 + 27y^3 = \underline{\underline{(2x + 3y)(4x^2 - 6xy + 9y^2)}}$
- (8) $x^3 - 9x^2y + 27xy^2 - 27y^3 = \underline{\underline{(x - 3y)^3}}$
- (9) $x^3 + 3x^2 + 3x + 1 = \underline{\underline{(x + 1)^3}}$
- (10) $x^3 + 6x^2 + 12x + 8 = \underline{\underline{(x + 2)^3}}$
- (11) $2x^4y - 16xy^4 = \underline{\underline{2xy(x - 2y)(x^2 + 2xy + 4y^2)}}$
- (12) $x^4 + x = \underline{\underline{x(x + 1)(x^2 - x + 1)}}$
- (13) $8a^3 - 64b^3 = \underline{\underline{8(a - 2b)(a^2 + 2ab + 4b^2)}}$
- (14) $3x^3 - 81y^3 = \underline{\underline{3(x - 3y)(x^2 + 3xy + 9y^2)}}$

3 因数分解/たすき掛け

次の式を因数分解せよ.

- (1) $4x^2 + 20x + 21 = \underline{\underline{(2x + 7)(2x + 3)}}$
- (2) $3x^2 - 16x + 21 = \underline{\underline{(3x - 7)(x - 3)}}$
- (3) $2x^2 - 13x - 45 = \underline{\underline{(2x + 5)(x - 9)}}$
- (4) $3x^2 - 19x - 14 = \underline{\underline{(3x + 2)(x - 7)}}$
- (5) $4x^2 - 27x + 35 = \underline{\underline{(x - 5)(4x - 7)}}$
- (6) $3x^2 + 13x + 14 = \underline{\underline{(3x + 7)(x + 2)}}$
- (7) $2x^2 + 19x + 35 = \underline{\underline{(x + 7)(2x + 5)}}$
- (8) $3x^2 + 14x + 15 = \underline{\underline{(3x + 5)(x + 3)}}$
- (9) $2x^2 - 3x + 1 = \underline{\underline{(2x - 1)(x - 1)}}$
- (10) $3x^2 + 17x - 28 = \underline{\underline{(3x - 4)(x + 7)}}$
- (11) $3x^2 + 10x + 7 = \underline{\underline{(x + 1)(3x + 7)}}$
- (12) $3x^2 + 8x + 4 = \underline{\underline{(3x + 2)(x + 2)}}$
- (13) $6x^2 - 5x - 6 = \underline{\underline{(3x + 2)(2x - 3)}}$
- (14) $3x^2 + 14x - 5 = \underline{\underline{(3x - 1)(x + 5)}}$
- (15) $3x^2 - 19x + 6 = \underline{\underline{(3x - 1)(x - 6)}}$
- (16) $3x^2 + 32x + 64 = \underline{\underline{(3x + 8)(x + 8)}}$
- (17) $2x^2 + 5x - 7 = \underline{\underline{(2x + 7)(x - 1)}}$
- (18) $4x^2 - 27x + 18 = \underline{\underline{(4x - 3)(x - 6)}}$

4 因数分解/置き換え

次の式を因数分解せよ.

- (1) $(x^2 - 2x + 1)(x^2 - 2x - 12) + 36 = \underline{\underline{(x + 1)(x + 2)(x - 3)(x - 4)}}$
- (2) $(x - y + 1)^2 - 4(x - y + 1) + 4 = \underline{\underline{(x - y - 1)^2}}$
- (3) $(x^2 - x + 1)(x^2 - x + 2) - 12 = \underline{\underline{(x^2 - x + 5)(x - 2)(x + 1)}}$
- (4) $(x + y)^2 - 16(y - z)^2 = \underline{\underline{(x + 5y - 4z)(x - 3y + 4z)}}$
- (5) $x^4 + x^2 - 2 = \underline{\underline{(x + 1)(x - 1)(x^2 + 2)}}$
- (6) $(x - 1)^2 + 7(x - 1) + 10 = \underline{\underline{(x + 1)(x + 4)}}$
- (7) $(x + y)^2 - 7(x + y) - 30 = \underline{\underline{(x + y - 10)(x + y + 3)}}$
- (8) $x^2 - 4(y + z)x + 3(y + z)^2 = \underline{\underline{(x - y - z)(x - 3y - 3z)}}$
- (9) $6(a - 2)^2 - 7(a - 2) - 3 = \underline{\underline{(3a - 5)(2a - 7)}}$
- (10) $(x^2 + 2x)(x^2 + 2x - 4) + 3 = \underline{\underline{(x + 3)(x - 1)(x^2 + 2x - 1)}}$
- (11) $(x + y)^2 + 6(x + y) + 9 = \underline{\underline{(x + y + 3)^2}}$
- (12) $x^4 - 10x^2 + 9 = \underline{\underline{(x + 1)(x - 1)(x + 3)(x - 3)}}$

- (13) $x^4 - 13x^2 + 36 = \underline{\underline{(x-2)(x+2)(x-3)(x+3)}}$
 (14) $x^4 + 2x^2 - 3 = \underline{\underline{(x+1)(x-1)(x^2+3)}}$
 (15) $(2x+1)^3 - (x-2)^3 = \underline{\underline{(x+3)(7x^2-3x+3)}}$
 (16) $(a+2)^3 - 27 = \underline{\underline{(a-1)(a^2+7a+19)}}$

5 因数分解/グループ分け

次の式を因数分解せよ.

- (1) $x^2 - 6x + 9 - 4y^2 = \underline{\underline{(x-2y-3)(x+2y-3)}}$
 (2) $9x^4 - 4x^2 + 8xy - 4y^2 = \underline{\underline{(3x^2+2x-2y)(3x^2-2x+2y)}}$
 (3) $x^2 - y^2 - 4y - 4 = \underline{\underline{(x+y+2)(x-y-2)}}$
 (4) $x^2 + 4x + 4 - y^2 = \underline{\underline{(x+y+2)(x-y+2)}}$
 (5) $a^2 + 4b^2 - 9c^2 - 4ab = \underline{\underline{(a-2b+3c)(a-2b-3c)}}$
 (6) $9x^2 - 4y^2 - 6x + 1 = \underline{\underline{(3x+2y-1)(3x-2y-1)}}$
 (7) $4x^2 - y^2 + 2y - 1 = \underline{\underline{(2x-y+1)(2x+y-1)}}$

6 因数分解/グループ分け・最低次数

次の式を因数分解せよ.

- (1) $4 - 4y + 2xy - x^2 = \underline{\underline{(x-2)(-x+2y-2)}}$
 (2) $xy - x - y + 1 = \underline{\underline{(x-1)(y-1)}}$
 (3) $2x^2 + 5xy + 2y^2 + x + 5y - 3 = \underline{\underline{(2x+y+3)(x+2y-1)}}$
 (4) $a^2b + a^2 - b - 1 = \underline{\underline{(a+1)(a-1)(b+1)}}$
 (5) $a^2 + b^2 + bc - ca - 2ab = \underline{\underline{(a-b)(a-b-c)}}$
 (6) $6x^2 + 7xy - 5y^2 - 11x + 12y - 7 = \underline{\underline{(3x+5y-7)(2x-y+1)}}$
 (7) $4x^2y - 4x^2z + y^2z - y^3 = \underline{\underline{(2x+y)(2x-y)(y-z)}}$
 (8) $x^2 - 9y + 3xy - 9 = \underline{\underline{(x-3)(x+3y+3)}}$
 (9) $x^2 + 6y - 3xy - 4 = \underline{\underline{(x-2)(x-3y+2)}}$

7 因数分解/たすき掛け

次の式を因数分解せよ.

- (1) $x^2 + (5y+5)x + (2y+3)(3y+2) = \underline{\underline{(x+2y+3)(x+3y+2)}}$
 (2) $x^2 + (2y-3)x - (3y-4)(y-1) = \underline{\underline{(x+3y-4)(x-y+1)}}$
 (3) $a^2 + ab - 4a - b + 3 = \underline{\underline{(a-1)(a+b-3)}}$
 (4) $x^2 + 3xy + 2y^2 - x - 3y - 2 = \underline{\underline{(x+y-2)(x+2y+1)}}$
 (5) $x^2 - xy - 6y^2 + 3x + y + 2 = \underline{\underline{(x+2y+1)(x-3y+2)}}$

- (6) $x^2 + ax + x + 2a - 2 = \underline{\underline{(x+2)(x+a-1)}}$
 (7) $x^2 - 2ax + a^2 - x + a - 2 = \underline{\underline{(x-a+1)(x-a-2)}}$
 (8) $x^2 + 3xy + 2y^2 - 2x - 3y + 1 = \underline{\underline{(x+y-1)(x+2y-1)}}$
 (9) $x^2 + 3xy + 2y^2 - 4x - 7y + 3 = \underline{\underline{(x+y-3)(x+2y-1)}}$
 (10) $x^2 - 3xy - 10y^2 + 2x + 25y - 15 = \underline{\underline{(x+2y-3)(x-5y+5)}}$
 (11) $x^2 + 3ax - 9a - 9 = \underline{\underline{(x-3)(x+3a+3)}}$

8 因数分解/いろいろ

次の式を因数分解せよ.

- (1) $ab(a-b) + bc(b-c) + ca(c-a) = \underline{\underline{-(a-b)(b-c)(c-a)}}$
 (2) $(x-1)(x-2)(x-3)(x-4) - 48 = \underline{\underline{(x^2-5x+12)(x^2-5x-2)}}$
 (3) $(a+b+c)(ab+bc+ca) - abc = \underline{\underline{(a+b)(b+c)(c+a)}}$
 (4) $(b+c)a^2 + (c+a)b^2 + (a+b)c^2 + 2abc = \underline{\underline{(a+b)(b+c)(c+a)}}$
 (5) $ab + ac + b^2 + bc = \underline{\underline{(a+b)(b+c)}}$
 (6) $a(b^2 - c^2) + b(c^2 - a^2) + c(a^2 - b^2) = \underline{\underline{(a-b)(b-c)(c-a)}}$
 (7) $a(b^2 - c^2) + b(c^2 - a^2) + c(a^2 - b^2) = \underline{\underline{(a-b)(b-c)(c-a)}}$
 (8) $a^2b + b^2c - a^2c - b^3 = \underline{\underline{(a+b)(a-b)(b-c)}}$
 (9) $(a-b)^3 + (b-c)^3 + (c-a)^3 = \underline{\underline{3(a-b)(b-c)(c-a)}}$
 (10) $a^2(b-c) + b^2(c-a) + c^2(a-b) = \underline{\underline{-(a-b)(b-c)(c-a)}}$