

1 素因数分解

次の数を素因数分解しなさい.

$$(1) 108 = \underline{\underline{2^2 \times 3^3}}$$

$$(2) 40 = \underline{\underline{2^3 \times 5}}$$

$$(3) 96 = \underline{\underline{2^5 \times 3}}$$

$$(4) 20 = \underline{\underline{2^2 \times 5}}$$

$$(5) 56 = \underline{\underline{2^3 \times 7}}$$

$$(6) 48 = \underline{\underline{2^4 \times 3}}$$

$$(7) 60 = \underline{\underline{2^2 \times 3 \times 5}}$$

$$(8) 13 = \underline{\underline{13}}$$

$$(9) 32 = \underline{\underline{2^5}}$$

$$(10) 18 = \underline{\underline{2 \times 3^2}}$$

$$(11) 120 = \underline{\underline{2^3 \times 3 \times 5}}$$

$$(12) 24 = \underline{\underline{2^3 \times 3}}$$

$$(13) 50 = \underline{\underline{2 \times 5^2}}$$

$$(14) 80 = \underline{\underline{2^4 \times 5}}$$

$$(15) 45 = \underline{\underline{3^2 \times 5}}$$

$$(16) 36 = \underline{\underline{2^2 \times 3^2}}$$

$$(17) 121 = \underline{\underline{11^2}}$$

$$(18) 70 = \underline{\underline{2 \times 5 \times 7}}$$

$$(19) 169 = \underline{\underline{13^2}}$$

$$(20) 27 = \underline{\underline{3^3}}$$

2 因数分解/共通因数

次の式を因数分解しなさい.

$$(1) x^3 + 8x^2 + 4x = x \underline{\underline{(x^2 + 8x + 4)}}$$

$$(2) x^3 - 9x^2 + x = x \underline{\underline{(x^2 - 9x + 1)}}$$

$$(3) x^2 + 3x = x \underline{\underline{(x + 3)}}$$

$$(4) x^2 - 6x = x \underline{\underline{(x - 6)}}$$

$$(5) 15x^2 - 35x = 5x \underline{\underline{(3x - 7)}}$$

$$(6) 4x^2 - 8x = 4x \underline{\underline{(x - 2)}}$$

$$(7) 2x^2 + 8x = 2x \underline{\underline{(x + 4)}}$$

$$(8) 2x^5 + 12x^4 = 2x^4 \underline{\underline{(x + 6)}}$$

$$(9) 3x^4 + 3x^3 + 3x^2 = 3x^2 \underline{\underline{(x^2 + x + 1)}}$$

$$(10) 6x^3 - 4x^2 = 2x^2 \underline{\underline{(3x - 2)}}$$

$$(11) 6x^4 + 9x^2 = 3x^2 \underline{\underline{(2x^2 + 3)}}$$

$$(12) 2x^3 - 14x^2 = 2x^2 \underline{\underline{(x - 7)}}$$

$$(13) 4x^5 + 14x^4 = 2x^4 \underline{\underline{(2x + 7)}}$$

$$(14) 4x^5 - 2x^4 = 2x^4 \underline{\underline{(2x - 1)}}$$

$$(15) 6x^4 + 2x^2 = 2x^2 \underline{\underline{(3x^2 + 1)}}$$

$$(16) 6x^4 + 2x^2 = 2x^2 \underline{\underline{(3x^2 + 1)}}$$

$$(17) 9x^7 - 6x^4 = 3x^4 \underline{\underline{(3x^3 - 2)}}$$

$$(18) 6x^4y^2 + 3x^3y + 9x^2y = 3x^2y \underline{\underline{(2x^2y + x + 3)}}$$

$$(19) 5x^5y^5 + 10x^4y^3 = 5x^4y^3 \underline{\underline{(xy^2 + 2)}}$$

$$(20) 12x^6y^5 - 4x^5y^3 - 12x^4y^3 = 4x^4y^3 \underline{\underline{(3x^2y^2 - x - 3)}}$$

3 因数分解/乗法公式 1

次の式を因数分解しなさい.

$$(1) x^2 - 16 = \underline{\underline{(x - 4)(x + 4)}}$$

$$(2) x^2 - 1 = \underline{\underline{(x + 1)(x - 1)}}$$

$$(3) 4x^2 - 49 = \underline{\underline{(2x + 7)(2x - 7)}}$$

$$(4) x^2 - 4 = \underline{\underline{(x + 2)(x - 2)}}$$

$$(5) x^2 - 9 = \underline{\underline{(x + 3)(x - 3)}}$$

$$(6) x^2 - 81 = \underline{\underline{(x - 9)(x + 9)}}$$

$$(7) 4x^2 - 9 = \underline{\underline{(2x + 3)(2x - 3)}}$$

$$(8) 16x^2 - 81 = \underline{\underline{(4x - 9)(4x + 9)}}$$

$$(9) x^2 - 64 = \underline{\underline{(x + 8)(x - 8)}}$$

$$(10) 4x^2 - 25 = \underline{\underline{(2x - 5)(2x + 5)}}$$

$$(11) x^2 - 36 = \underline{\underline{(x + 6)(x - 6)}}$$

- (12) $x^2 - 25 = \underline{\underline{(x+5)(x-5)}}$
 (13) $4x^2 - 81 = \underline{\underline{(2x-9)(2x+9)}}$
 (14) $9x^2 - 4 = \underline{\underline{(3x+2)(3x-2)}}$
 (15) $16x^2 - 1 = \underline{\underline{(4x+1)(4x-1)}}$
 (16) $9x^2 - 1 = \underline{\underline{(3x-1)(3x+1)}}$
 (17) $16x^2 - 9 = \underline{\underline{(4x+3)(4x-3)}}$
 (18) $9x^2 - 25 = \underline{\underline{(3x+5)(3x-5)}}$
 (19) $16x^2 - 49 = \underline{\underline{(4x+7)(4x-7)}}$
 (20) $x^2 - 49 = \underline{\underline{(x+7)(x-7)}}$

4 因数分解/乗法公式 2・3

次の式を因数分解しなさい.

- (1) $x^2 + 12x + 36 = \underline{\underline{(x+6)^2}}$
 (2) $x^2 - 10x + 25 = \underline{\underline{(x-5)^2}}$
 (3) $x^2 - 8x + 16 = \underline{\underline{(x-4)^2}}$
 (4) $x^2 + 16x + 64 = \underline{\underline{(x+8)^2}}$
 (5) $x^2 + 2x + 1 = \underline{\underline{(x+1)^2}}$
 (6) $x^2 + 6x + 9 = \underline{\underline{(x+3)^2}}$
 (7) $x^2 - 14x + 49 = \underline{\underline{(x-7)^2}}$
 (8) $x^2 + 8xy + 16y^2 = \underline{\underline{(x+4y)^2}}$
 (9) $x^2 - 2xy + y^2 = \underline{\underline{(x-y)^2}}$
 (10) $x^2 - 10xy + 25y^2 = \underline{\underline{(x-5y)^2}}$
 (11) $x^2 + 4xy + 4y^2 = \underline{\underline{(x+2y)^2}}$
 (12) $4x^2 + 28x + 49 = \underline{\underline{(2x+7)^2}}$
 (13) $9a^2 - 6ab + b^2 = \underline{\underline{(3a-b)^2}}$
 (14) $16x^2 - 24x + 9 = \underline{\underline{(4x-3)^2}}$
 (15) $9x^2 - 24x + 16 = \underline{\underline{(3x-4)^2}}$
 (16) $4x^2 - 4x + 1 = \underline{\underline{(2x-1)^2}}$
 (17) $x^2 - 16xy + 64y^2 = \underline{\underline{(x-8y)^2}}$

- (18) $49x^2 + 14x + 1 = \underline{\underline{(7x+1)^2}}$
 (19) $4x^2 + 12x + 9 = \underline{\underline{(2x+3)^2}}$
 (20) $4x^2 - 20x + 25 = \underline{\underline{(2x-5)^2}}$
 (21) $t^2 - 4t + 4 = \underline{\underline{(t-2)^2}}$
 (22) $16x^2 + 56x + 49 = \underline{\underline{(4x+7)^2}}$
 (23) $9x^2 + 48x + 64 = \underline{\underline{(3x+8)^2}}$
 (24) $x^2 - 18x + 81 = \underline{\underline{(x-9)^2}}$
 (25) $9x^2 - 30xy + 25y^2 = \underline{\underline{(3x-5y)^2}}$
 (26) $4x^2 - 12x + 9 = \underline{\underline{(2x-3)^2}}$
 (27) $x^2 + 12x + 36 = \underline{\underline{(x+6)^2}}$
 (28) $x^2 + 8x + 16 = \underline{\underline{(x+4)^2}}$
 (29) $9x^2 + 24x + 16 = \underline{\underline{(3x+4)^2}}$
 (30) $16x^2 - 56x + 49 = \underline{\underline{(4x-7)^2}}$

5 因数分解/乗法公式 4

次の式を因数分解しなさい.

- (1) $x^2 + 7x + 10 = \underline{\underline{(x+5)(x+2)}}$
 (2) $x^2 + 8x - 9 = \underline{\underline{(x+9)(x-1)}}$
 (3) $x^2 + 6x - 7 = \underline{\underline{(x-1)(x+7)}}$
 (4) $x^2 - 6x + 8 = \underline{\underline{(x-4)(x-2)}}$
 (5) $x^2 - x - 56 = \underline{\underline{(x+7)(x-8)}}$
 (6) $x^2 - 15x + 56 = \underline{\underline{(x-8)(x-7)}}$
 (7) $x^2 - x - 20 = \underline{\underline{(x+4)(x-5)}}$
 (8) $x^2 - 4x - 21 = \underline{\underline{(x+3)(x-7)}}$
 (9) $x^2 + 7x + 12 = \underline{\underline{(x+3)(x+4)}}$
 (10) $x^2 - 8x + 15 = \underline{\underline{(x-5)(x-3)}}$
 (11) $x^2 - 5x + 6 = \underline{\underline{(x-3)(x-2)}}$
 (12) $x^2 + x - 30 = \underline{\underline{(x-5)(x+6)}}$
 (13) $x^2 - 8x + 12 = \underline{\underline{(x-6)(x-2)}}$

- (14) $x^2 - 3x - 4 = \underline{\underline{=(x+1)(x-4)}}$
- (15) $x^2 - 6x - 16 = \underline{\underline{=(x+2)(x-8)}}$
- (16) $x^2 + 13x + 36 = \underline{\underline{=(x+9)(x+4)}}$
- (17) $x^2 - 4x + 3 = \underline{\underline{=(x-3)(x-1)}}$
- (18) $x^2 - 7x - 8 = \underline{\underline{=(x+1)(x-8)}}$
- (19) $x^2 - 9x + 8 = \underline{\underline{=(x-1)(x-8)}}$
- (20) $x^2 + x - 42 = \underline{\underline{=(x-6)(x+7)}}$
- (21) $x^2 - 4x - 5 = \underline{\underline{=(x+1)(x-5)}}$
- (22) $x^2 + 2x - 48 = \underline{\underline{=(x+8)(x-6)}}$
- (23) $x^2 + 4x - 12 = \underline{\underline{=(x+6)(x-2)}}$
- (24) $x^2 + 7x - 8 = \underline{\underline{=(x+8)(x-1)}}$
- (25) $x^2 - 4x - 5 = \underline{\underline{=(x-5)(x+1)}}$
- (26) $x^2 - 12x + 32 = \underline{\underline{=(x-8)(x-4)}}$
- (27) $x^2 + 5x - 24 = \underline{\underline{=(x+8)(x-3)}}$
- (28) $x^2 + 11x + 28 = \underline{\underline{=(x+7)(x+4)}}$
- (29) $x^2 - 3x - 40 = \underline{\underline{=(x-8)(x+5)}}$
- (30) $x^2 - 7x + 6 = \underline{\underline{=(x-1)(x-6)}}$
- (31) $x^2 - 4x - 21 = \underline{\underline{=(x-7)(x+3)}}$
- (32) $x^2 - 13x + 36 = \underline{\underline{=(x-4)(x-9)}}$
- (33) $x^2 + 10x + 9 = \underline{\underline{=(x+1)(x+9)}}$
- (34) $x^2 - 4x + 3 = \underline{\underline{=(x-3)(x-1)}}$
- (35) $x^2 - x - 6 = \underline{\underline{=(x+2)(x-3)}}$
- (36) $x^2 + 7x + 10 = \underline{\underline{=(x+5)(x+2)}}$
- (37) $x^2 - 5xy + 6y^2 = \underline{\underline{=(x-3y)(x-2y)}}$
- (38) $x^2 - 7xy + 12y^2 = \underline{\underline{=(x-4y)(x-3y)}}$
- (39) $x^2 - 6xy + 8y^2 = \underline{\underline{=(x-2y)(x-4y)}}$
- (40) $x^2 + 2xy - 35y^2 = \underline{\underline{=(x+7y)(x-5y)}}$
- (41) $x^2 - xy - 72y^2 = \underline{\underline{=(x-9y)(x+8y)}}$
- (42) $x^2 - 12xy + 35y^2 = \underline{\underline{=(x-5y)(x-7y)}}$
- (43) $x^2 - 12xy + 27y^2 = \underline{\underline{=(x-3y)(x-9y)}}$

6 因数分解/いろいろ

次の式を因数分解しなさい。(答の順番が違うものは正解. マイナスは基本外にくくりだしておく方がよい.)

- (1) $2x^2 + 20x + 42 = \underline{\underline{=2(x+3)(x+7)}}$
- (2) $2x^2 - 14x + 20 = \underline{\underline{=2(x-2)(x-5)}}$
- (3) $-4x^2 + 48x - 140 = \underline{\underline{=-4(x-5)(x-7)}}$
- (4) $-4x^2 - 56x - 196 = \underline{\underline{=-4(x+7)^2}}$
- (5) $4x^2 - 64 = \underline{\underline{=4(x+4)(x-4)}}$
- (6) $\frac{1}{8}x^2 - \frac{1}{4}x - 1 = \underline{\underline{=\frac{1}{8}(x-4)(x+2)}}$
- (7) $3a^2 - 15a + 18 = \underline{\underline{=3(a-2)(a-3)}}$
- (8) $-2y^2 + 14y - 20 = \underline{\underline{=-2(y-2)(y-5)}}$
- (9) $-4y^2 + 16y + 180 = \underline{\underline{=-4(y+5)(y-9)}}$
- (10) $\frac{2}{3}x^2 + 2x - 12 = \underline{\underline{=\frac{2}{3}(x+6)(x-3)}}$
- (11) $9y^2 - 90y + 189 = \underline{\underline{=9(y-3)(y-7)}}$
- (12) $9a^2 + 135a + 504 = \underline{\underline{=9(a+7)(a+8)}}$
- (13) $-4x^2y + 256y = \underline{\underline{=-4y(x+8)(x-8)}}$
- (14) $4x^2y + 12xy + 8y = \underline{\underline{=4y(x+1)(x+2)}}$
- (15) $-9x^2y + 72xy - 108y = \underline{\underline{=-9y(x-2)(x-6)}}$
- (16) $-9x^2y + 54xy - 81y = \underline{\underline{=-9y(x-3)^2}}$
- (17) $2x^2y - 22xy + 48y = \underline{\underline{=2y(x-3)(x-8)}}$
- (18) $-2ab^2 - 28ab - 98a = \underline{\underline{=-2a(b+7)^2}}$
- (19) $3ab^2 - 27a = \underline{\underline{=3a(b-3)(b+3)}}$
- (20) $-4a^2b + 16ab + 20b = \underline{\underline{=-4b(a+1)(a-5)}}$
- (21) $3x^2 - 24xy + 48y^2 = \underline{\underline{=3(x-4y)^2}}$
- (22) $2x^2 - 26xy + 84y^2 = \underline{\underline{=2(x-6y)(x-7y)}}$
- (23) $-3x^2 - 21xy - 30y^2 = \underline{\underline{=-3(x+2y)(x+5y)}}$
- (24) $3x^2 + 27xy + 24y^2 = \underline{\underline{=3(x+y)(x+8y)}}$
- (25) $-2x^2 + 18xy - 16y^2 = \underline{\underline{=-2(x-y)(x-8y)}}$

$$(26) \quad 3a^2 - 24ab - 27b^2 = \underline{\underline{3(a+b)(a-9b)}}$$

$$(27) \quad 2a^2 - 24ab + 64b^2 = \underline{\underline{2(a-4b)(a-8b)}}$$

7 因数分解/置き換え

次の式を因数分解しなさい.

$$(1) \quad (x-y)^2 + 9(x-y) + 18 = \underline{\underline{(x-y+3)(x-y+6)}}$$

$$(2) \quad (x+2y)^2 - 13(x+2y) + 36 = \underline{\underline{(x+2y-9)(x+2y-4)}}$$

$$(3) \quad (x-y)^2 + 8(x-y) - 9 = \underline{\underline{(x-y+9)(x-y-1)}}$$

$$(4) \quad (3x-y)^2 + 7(3x-y) - 18 = \underline{\underline{(3x-y-2)(3x-y+9)}}$$

$$(5) \quad (x+y)^2 - 36 = \underline{\underline{(x+y-6)(x+y+6)}}$$

$$(6) \quad (x+y)^2 + 8(x+y) + 16 = \underline{\underline{(x+y+4)^2}}$$

$$(7) \quad (x+y)^2 - 7(x+y) + 6 = \underline{\underline{(x+y-6)(x+y-1)}}$$

$$(8) \quad (2x+y)^2 + 7(2x+y) - 8 = \underline{\underline{(2x+y-1)(2x+y+8)}}$$

$$(9) \quad (x+5y)^2 - 14(x+5y) + 49 = \underline{\underline{(x+5y-7)^2}}$$

$$(10) \quad (x+y)^2 - 16(x+y) + 63 = \underline{\underline{(x+y-7)(x+y-9)}}$$

$$(11) \quad (x+y)^2 - 5(x+y) - 24 = \underline{\underline{(x+y+3)(x+y-8)}}$$

$$(12) \quad (x-y)^2 - (y-x) - 6 = \underline{\underline{(x-y+3)(x-y-2)}}$$

$$(13) \quad (x-y)^2 - 6(y-x) - 55 = \underline{\underline{(x-y+5)(x-y-11)}}$$

$$(14) \quad (x-y)^2 - (y-x) - 12 = \underline{\underline{(x-y+4)(x-y-3)}}$$

$$(15) \quad (x-y)^2 + 10(y-x) + 16 = \underline{\underline{(x-y-2)(x-y-8)}}$$

$$(16) \quad (x+3)^2 + 4(x+3) - 32 = \{(x+3)+8\} \{(x+3)-4\} = \underline{\underline{(x+11)(x-1)}}$$

$$(17) \quad (x-4)^2 + 7(x-4) + 6 = \{(x-4)+6\} \{(x-4)+1\} = \underline{\underline{(x+2)(x-3)}}$$

$$(18) \quad (2+y)^2 + 10(2+y) + 16 = \{(2+y)+2\} \{(2+y)+8\} = \underline{\underline{(x+y+2)(x+y+8)}}$$

$$(19) \quad (x+6)^2 - 3(x+6) - 18 = \{(x+6)+3\} \{(x+6)-6\} = \underline{\underline{=x(x+9)}}$$

$$(20) \quad (x^2 + 3x)^2 - 2(x^2 + 3x) - 8 = (x^2 + 3x - 4)(x^2 + 3x + 2)$$

$$= \underline{\underline{(x-1)(x+4)(x+1)(x+2)}}$$

$$(21) \quad (x^2-x)^2 - 8(x^2-x) + 12 = (x^2-x-2)(x^2-x-6) = \underline{\underline{(x-2)(x+1)(x-3)(x+2)}}$$