

式の計算⑤ 解答と解説

1

解答 (1) $x^2 + y^2 + z^2 - 2xy - 2yz + 2zx$

(2) $a^2 + b^2 + 2ab + 6a + 6b + 9$

(3) $a^2 + b^2 + 4c^2 + 2ab + 4bc + 4ca$

(4) $9a^2 + 4b^2 + 16c^2 + 12ab - 16bc - 24ca$

(5) $4p^2 + 9q^2 + r^2 - 12pq - 6qr + 4rp$

(6) $25x^2 + y^2 + 9z^2 - 10xy - 6yz + 30zx$

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

$$= (x - y)^2 + 2(x - y)z + z^2$$

$$= x^2 - 2xy + y^2 + 2zx - 2yz + z^2$$

$$= x^2 + y^2 + z^2 - 2xy - 2yz + 2zx$$

(2) $(a + b + 3)^2 = \{(a + b) + 3\}^2$

$$= (a + b)^2 + 2(a + b) \times 3 + 3^2$$

$$= a^2 + 2ab + b^2 + 6a + 6b + 9$$

$$= a^2 + b^2 + 2ab + 6a + 6b + 9$$

(3) $(a + b + 2c)^2 = \{(a + b) + 2c\}^2$

$$= (a + b)^2 + 2(a + b) \times 2c + (2c)^2$$

$$= a^2 + 2ab + b^2 + 4ca + 4bc + 4c^2$$

$$= a^2 + b^2 + 4c^2 + 2ab + 4bc + 4ca$$

(4) $(3a + 2b - 4c)^2 = \{(3a + 2b) - 4c\}^2$

$$= (3a + 2b)^2 - 2(3a + 2b) \times 4c + (4c)^2$$

$$= 9a^2 + 12ab + 4b^2 - 24ca - 16bc + 16c^2$$

$$= 9a^2 + 4b^2 + 16c^2 + 12ab - 16bc - 24ca$$

(5) $(2p - 3q + r)^2 = \{(2p - 3q) + r\}^2$

$$= (2p - 3q)^2 + 2(2p - 3q) \times r + r^2$$

$$= 4p^2 - 12pq + 9q^2 + 4rp - 6qr + r^2$$

$$= 4p^2 + 9q^2 + r^2 - 12pq - 6qr + 4rp$$

(6) $(-5x + y - 3z)^2 = \{(-5x + y) - 3z\}^2$

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

$$= 25x^2 - 10xy + y^2 + 30zx - 6yz + 9z^2$$

$$= 25x^2 + y^2 + 9z^2 - 10xy - 6yz + 30zx$$

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- (1) $x^2 + 2xy + y^2 + 5x + 5y + 6$
 (2) $a^2 + 2ab + b^2 + 7a + 7b - 60$
 (3) $x^2 - 4xy + 4y^2 - 6x + 12y - 27$
 (4) $4a^2 - 12ab + 9b^2 - 6a + 9b - 4$
 (5) $4x^2 + y^2 - 4z^2 + 4xy + 3yz + 6zx$
 (6) $16p^2 + 25q^2 - 6r^2 - 40pq + 5qr - 4rp$
 (7) $7x^2 + 9y^2 + 16z^2 + 24xy - 24yz - 32zx$
 (8) $28a^2 + 9b^2 + 4c^2 - 33ab + 12bc - 22ca$
- (1) $(x+y+3)(x+y+2) = \{(x+y) + 3\}\{(x+y) + 2\}$
 $= (x+y)^2 + 5(x+y) + 6$
 $= x^2 + 2xy + y^2 + 5x + 5y + 6$
 (2) $(a+b-5)(a+b+12) = \{(a+b) - 5\}\{(a+b) + 12\}$
 $= (a+b)^2 + 7(a+b) - 60$
 $= a^2 + 2ab + b^2 + 7a + 7b - 60$
 (3) $(x-2y+3)(x-2y-9) = \{(x-2y) + 3\}\{(x-2y) - 9\}$
 $= (x-2y)^2 - 6(x-2y) - 27$
 $= x^2 - 4xy + 4y^2 - 6x + 12y - 27$
 (4) $(2a-3b+1)(2a-3b-4) = \{(2a-3b) + 1\}\{(2a-3b) - 4\}$
 $= (2a-3b)^2 - 3(2a-3b) - 4$
 $= 4a^2 - 12ab + 9b^2 - 6a + 9b - 4$
 (5) $(2x+y-z)(2x+y+4z) = \{(2x+y) - z\}\{(2x+y) + 4z\}$
 $= (2x+y)^2 + 3z(2x+y) - 4z^2$
 $= 4x^2 + 4xy + y^2 + 6zx + 3yz - 4z^2$
 $= 4x^2 + y^2 - 4z^2 + 4xy + 3yz + 6zx$
 (6) $(4p-5q+2r)(4p-5q-3r) = \{(4p-5q) + 2r\}\{(4p-5q) - 3r\}$
 $= (4p-5q)^2 - r(4p-5q) - 6r^2$
 $= 16p^2 - 40pq + 25q^2 - 4rp + 5qr - 6r^2$
 $= 16p^2 + 25q^2 - 6r^2 - 40pq + 5qr - 4rp$
 (7) $(7x+3y-4z)(x+3y-4z) = \{7x + (3y-4z)\}\{x + (3y-4z)\}$
 $= 7x^2 + 8x(3y-4z) + (3y-4z)^2$
 $= 7x^2 + 24xy - 32zx + 9y^2 - 24yz + 16z^2$

$$= 7x^2 + 9y^2 + 16z^2 + 24xy - 24yz - 32zx$$

$$(8) (4a-3b-2c)(7a-3b-2c) = \{4a - (3b+2c)\}\{7a - (3b+2c)\}$$

$$= 28a^2 - 11a(3b+2c) + (3b+2c)^2$$

$$= 28a^2 - 33ab - 22ca + 9b^2 + 12bc + 4c^2$$

$$= 28a^2 + 9b^2 + 4c^2 - 33ab + 12bc - 22ca$$

$$\text{3 解答 (1) } a^2 - b^2 + 2bc - c^2 \quad (2) x^2 - 9y^2 + 30yz - 25z^2$$

$$(3) 3x^2 + 24xy + 48y^2 - 7x - 28y + 2 \quad (4) a^4 + 15a^3 + 26a^2 - 48a + 16$$

$$(1) (a+b-c)(a-b+c) = \{a + (b-c)\}\{a - (b-c)\}$$

$$= a^2 - (b-c)^2$$

$$= a^2 - (b^2 - 2bc + c^2)$$

$$= a^2 - b^2 + 2bc - c^2$$

$$(2) (x-3y+5z)(x+3y-5z) = \{x - (3y-5z)\}\{x + (3y-5z)\}$$

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

$$= x^2 - (9y^2 - 30yz + 25z^2)$$

$$= x^2 - 9y^2 + 30yz - 25z^2$$

$$(3) (x+4y-2)(3x+12y-1) = \{(x+4y) - 2\}\{3(x+4y) - 1\}$$

$$= 3(x+4y)^2 - 7(x+4y) + 2$$

$$= 3(x^2 + 8xy + 16y^2) - 7x - 28y + 2$$

$$= 3x^2 + 24xy + 48y^2 - 7x - 28y + 2$$

$$(4) (a^2+3a-2)(a^2+12a-8) = \{a^2 + (3a-2)\}\{a^2 + 4(3a-2)\}$$

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

$$= a^4 + 15a^3 - 10a^2 + 4(9a^2 - 12a + 4)$$

$$= a^4 + 15a^3 - 10a^2 + 36a^2 - 48a + 16$$

$$= a^4 + 15a^3 + 26a^2 - 48a + 16$$