

1 式の計算

P 1

- 1 (1) a について… 1 次式, 係数… $-3x^2y^2$ y について… 2 次式, 係数… $-3ax^2$
 (2) p について… 4 次式, 係数… $-q^3r^2$ q について… 3 次式, 係数… $-p^4r^2$
 (3) x について… 2 次式, 係数… $-\frac{3}{4}aby^3$ y について… 3 次式, 係数… $-\frac{3}{4}abx^2$
 a, b について… 2 次式, 係数… $-\frac{3}{4}x^2y^3$ x, y について… 5 次式, 係数… $-\frac{3}{4}ab$
 2 (1) $-2x^2-10x$, 2 次式 (2) $3x^3+3xy+5y^2$, 3 次式
 3 (1) $4x^2+4x+5$ (2) $6y^2+2xy+x^2$ (3) $(b-c)a^2+(-b^2+c^2)a+b^2c-bc^2$

P 2

- 4 (1) 和… $-x^2-9x+4$, 差… $-5x^2+5x-6$ (2) 和… $3x^2+x-2$, 差… $-x^2+3x-4$
 (3) 和… $x^2+5xy-4y^2$, 差… $3x^2+xy-6y^2$ (4) 和… $-2x^2-3xy+5y^2$, 差… $4x^2-7xy-y^2$
 5 (1) 和… $3x^3+x^2+2x-3$, 差… $-x^3-5x^2+4x-13$
 (2) 和… $-x^3+5x^2y+6xy^2-2y^3$, 差… $5x^3+x^2y-10xy^2-8y^3$
 6 (1) $12x^6y^5z^2$ (2) $p^{18}q^{14}$ (3) $-9a^7b^{12}$ (4) $576a^8b^8$
 7 (1) $2a^4b-3a^3b^2+4a^2b^3$ (2) $-5x^4+17x^3-7x^2+3x$ (3) $2x^2-x^2y-6xy^2-6x-9y$
 (4) $3a^3-2a^2b+5ab^2+2b^3$
 8 (1) $a^2+(2b+3c)a+b^2+3bc+2c^2$ (2) $(b+c)a^3+bc a^2+(b^3+b^2c+bc^2+c^3)a+b^3c+bc^3$

P 3

- 9 (1) $p^2+10pq+25q^2$ (2) $9a^2-24a+16$ (3) $x^4+2x^2+x^2$ (4) $4a^2-25b^2$ (5) a^4-b^4 (6) $p^2q^2-r^2$
 (7) $9z^2-4x^4$ (8) $x^2-3x-40$ (9) $a^2+5ab-6b^2$ (10) $4x^2+8xy+3y^2$ (11) $p^2q^2-pq-12$
 (12) a^4+4a^2-21 (13) $6x^2+5xy-6y^2$ (14) $14a^2+29a-15$ (15) $-15x^2y^2+34xy-16$
 10 (1) 与式 = $\{(x+y)+z\}\{(x+y)-z\}=(x+y)^2-z^2=x^2+2xy+y^2-z^2$
 (2) 与式 = $\{(2a+c)-b\}\{(2a+c)+b\}=(2a+c)^2-b^2=4a^2+4ac+c^2-b^2$
 (3) 与式 = $\{(x^2+1)-x\}\{(x^2+1)+x\}=(x^2+1)^2-x^2=x^4+2x^2+1-x^2=x^4+x^2+1$
 (4) 与式 = $\{xy-(x-2)\}\{xy+(x-2)\}=(xy)^2-(x-2)^2=x^2y^2-x^2+4x-4$
 (5) 与式 = $\{(x+y)-4z\}\{(x+y)+z\}=(x+y)^2-3z(x+y)-4z^2=x^2+y^2-4z^2+2xy-3yz-3zx$
 (6) 与式 = $\{(2x-y)-1\}\{(2x-y)+3\}=(2x-y)^2-4(2x-y)+3=4x^2-4xy+y^2-8x+4y+3$
 (7) 与式 = $\{(x+y)+3\}^2=(x+y)^2+6(x+y)+9=x^2+2xy+y^2+6x+6y+9$
 (8) 与式 = $\{(a+2b)-c\}^2=(a+2b)^2-2c(a+2b)+c^2=a^2+4b^2+c^2+4ab-4bc-2ca$
 (9) 与式 = $\{(x^2+x)-2\}^2=(x^2+x)^2-4(x^2+x)+4=x^4+2x^3-3x^2-4x+4$
 (10) 与式 = $(x^2-9)(x^2+9)=x^4-81$ (11) 与式 = $(p^2-1)(p^2-9)=p^4-10p^2+9$
 (12) 与式 = $a(a-3)(a-1)(a-2)=(a^2-3a)(a^2-3a+2)=(a^2-3a)\{(a^2-3a)+2\}=(a^2-3a)^2+2(a^2-3a)$
 $=a^4-6a^3+9a^2+2a^2-6a=a^4-6a^3+11a^2-6a$
 (13) 与式 = $(x+1)(x+7)(x+3)(x+5)=(x^2+8x+7)(x^2+8x+15)=\{(x^2+8x)+7\}\{(x^2+8x)+15\}$
 $=(x^2+8x)^2+22(x^2+8x)+105=x^4+16x^3+64x^2+22x^2+176x+105=x^4+16x^3+86x^2+176x+105$

P 4

- 11 (1) $3b(a-2b)$ (2) $4xy(y-3x)$ (3) $ab(xy-pq)$ (4) $a(a+5)$ (5) $2a^2(a^2-3)$
 (6) $xy(xy-2x+3)$ (7) $5a^2bc(ab-3c-4bc^2)$ (8) $2(a+b)(a+3b)$ (9) $(x-y)(a-1)$
 (10) $3(x-y)(a+2b-3c)$
 12 (1) $(a+5)^2$ (2) $(x-8)^2$ (3) $(x-4y)^2$ (4) $(a+7b)^2$ (5) $(3x+1)^2$ (6) $(8a-3b)^2$
 (7) $3p(p-2)^2$ (8) $xy(2x+y)^2$

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- 13 (1) $(x+2)(x-2)$ (2) $(a+8)(a-8)$ (3) $(3x+4y)(3x-4y)$ (4) $(2xy+z)(2xy-z)$
 (5) $(x+y+2z)(x+y-2z)$ (6) $(a+b+c-d)(a+b-c+d)$ (7) $x^2(x+5)(x-5)$
 (8) $2a(a+3b)(a-3b)$
 14 (1) $(a+7)(a-1)$ (2) $(x-2)(x-6)$ (3) $(x+7)(x-2)$ (4) $(a+5b)(a-6b)$ (5) $(x+8y)(x-5y)$
 (6) $(m+3n)(m+6n)$ (7) $x(x+2)(x-4)$ (8) $3x^2y(x+3y)(x+9y)$

15 (1)与式 $= (a+1)^2 - x^2 = (a+x+1)(a-x+1)$ (2)与式 $= (2a-b)^2 - 9c^2 = (2a-b+3c)(2a-b-3c)$
 (3)与式 $= 9x^2 - (y-2)^2 = (3x+y-2)(3x-y+2)$ (4)与式 $= (x+2)^2 + 2y(x+2) = (x+2)(x+2y+2)$
 16 (1)
$$\begin{array}{r} 1 \quad -6 \rightarrow -12 \\ 2 \quad -1 \rightarrow 1 \\ \hline -13 \end{array}$$
 (2)
$$\begin{array}{r} 3 \quad -4y \rightarrow -16y \\ 4 \quad 3y \rightarrow 9y \\ \hline -7y \end{array}$$
 (3)
$$\begin{array}{r} 1 \quad 1 \rightarrow 2 \\ 2 \quad 1 \rightarrow 1 \\ \hline 3 \end{array}$$
 (4)
$$\begin{array}{r} 1 \quad b \rightarrow 5b \\ 5 \quad 2b \rightarrow 2b \\ \hline 7b \end{array}$$

与式 $= (x-6)(2x-1)$ 与式 $= (3x-4y)(4x+3y)$ 与式 $= (x+1)(2x+1)$ 与式 $= (a+b)(5a+2b)$
 (5) $(a-3)(2a+1)$ (6) $(2x-y)(4x-3y)$ (7) $(3a+4)(4a-3)$ (8) $(x-10y)(4x-y)$ (9) $(a-1)(5a+2)$
 (10) $(a+b)(3a+2b)$ (11) $(m-3)(5m-2)$ (12) $(2s-5t)(4s+3t)$

P 6

17 (1)与式 $= x(y-1) - (y-1) = (x-1)(y-1)$
 (2)与式 $= z(x^2-y^2) + x^2y - y^3 = z(x^2-y^2) + y(x^2-y^2) = (y+z)(x^2-y^2) = (y+z)(x+y)(x-y)$
 (3)与式 $= ab^2 - ac^2 + bc^2 - ba^2 + ca^2 - cb^2 = -a^2(b-c) + a(b^2-c^2) - bc(b-c)$
 $= -(b-c)\{a^2 - (b+c)a + bc\} = -(b-c)(a-b)(a-c) = (a-b)(b-c)(c-a)$
 (4)与式 $= a^2b - ab^2 + b^2c - bc^2 + c^2a - ca^2 = (b-c)a^2 - (b^2-c^2)a + bc(b-c)$
 $= (b-c)\{a^2 - (b+c)a + bc\} = (b-c)(a-b)(a-c)$
 18 (1) $a+b=X$ とおくと, 与式 $= X^2 + 10X + 25 = (X+5)^2 = (a+b+5)^2$
 (2) $x+y=X$ とおくと, 与式 $= 5X^2 - 8X - 4 = (X-2)(5X+2) = (x+y-2)(5x+5y+2)$
 (3) $x^2+4x=X$ とおくと,
 与式 $= X^2 - 8X - 48 = (X+4)(X-12) = (x^2+4x+4)(x^2+4x-12) = (x+2)^2(x+6)(x-2)$
 (4) $x^2-3x=X$ とおくと,
 与式 $= 3X^2 - 10X - 8 = (X-4)(3X+2) = (x^2-3x-4)(3x^2-9x+2) = (x+1)(x-4)(3x^2-9x+2)$
 19 (1)与式 $= x^2 + (-y+5)x - (12y^2 - y - 6) = x^2 + (-y+5)x - (3y+2)(4y-3) = (x+3y+2)(x-4y+3)$
 (2)与式 $= x^2 + (3y+4)x + 2y^2 + 5y + 3 = x^2 + (3y+4)x + (y+1)(2y+3) = (x+y+1)(x+2y+3)$
 (3)与式 $= 2x^2 + (5y+2)x + 3y^2 + 4y - 4 = 2x^2 + (5y+2)x + (y+2)(3y-2) = (x+y+2)(2x+3y-2)$
 (4)与式 $= 6x^2 + (-5y+4)x - (6y^2 - 7y + 2) = 6x^2 + (-5y+4)x - (2y-1)(3y-2)$
 $= \{2x - (3y-2)\}\{3x + (2y-1)\} = (2x-3y+2)(3x+2y-1)$

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20 (1)与式 $= (x^2)^2 - 9^2 = (x^2+9)(x^2-9) = (x+3)(x-3)(x^2+9)$
 (2)与式 $= (x^2)^2 - 8x^2 + 16 = (x^2-4)^2 = \{(x+2)(x-2)\}^2 = (x+2)^2(x-2)^2$
 (3)与式 $= (x^2)^2 - 10x^2 + 9 = (x^2-1)(x^2-9) = (x+1)(x-1)(x+3)(x-3)$
 (4)与式 $= (x^2)^2 - 29x^2 + 100 = (x^2-4)(x^2-25) = (x+2)(x-2)(x+5)(x-5)$
 (5)与式 $= 3(x^2)^2 - x^2 - 2 = (x^2-1)(3x^2+2) = (x+1)(x-1)(3x^2+2)$
 (6)与式 $= 4(x^2)^2 - 25x^2 + 36 = (x^2-4)(4x^2-9) = (x+2)(x-2)(2x+3)(2x-3)$
 21 (1)与式 $= x^4 + 16x^2 + 64 - 16x^2 = (x^2+8)^2 - (4x)^2 = (x^2+4x+8)(x^2-4x+8)$
 (2)与式 $= x^4 + 2x^2 + 1 - x^2 = (x^2+1)^2 - x^2 = (x^2+x+1)(x^2-x+1)$
 (3)与式 $= 4x^4 + 4x^2y^2 + y^4 - 4x^2y^2 = (2x^2+y^2)^2 - (2xy)^2 = (2x^2+2xy+y^2)(2x^2-2xy+y^2)$
 (4)与式 $= a^4 + 10a^2b^2 + 25b^4 - 9a^2b^2 = (a^2+5b^2)^2 - (3ab)^2 = (a^2+3ab+5b^2)(a^2-3ab+5b^2)$
 (5)与式 $= a^4 + 6a^2 + 9 - 9a^2 = (a^2+3)^2 - (3a)^2 = (a^2+3a+3)(a^2-3a+3)$
 (6)与式 $= a^4 + 24a^2b^2 + 144b^4 - 36a^2b^2 = (a^2+12b^2)^2 - (6ab)^2 = (a^2+6ab+12b^2)(a^2-6ab+12b^2)$
 22 (1) a^3+3a^2+3a+1 (2) $x^3-9x^2y+27xy^2-27y^3$ (3) $27x^3-54x^2+36x-8$
 (4) $125a^3+75a^2b+15ab^2+b^3$ (5) ka^3-8 (6) p^3+64 (7) x^3y^2+27 (8) $27a^3-8b^3$

P 8

23 (1)与式 $= \{(a+2)(a-2)\}^3 = (a^2-4)^3 = a^6 - 12a^4 + 48a^2 - 64$
 (2)与式 $= \{(x-1)(x^2+x+1)\}^2 = (x^3-1)^2 = x^6 - 2x^3 + 1$
 (3)与式 $= (a+b)(a^2-ab+b^2)(a-b)(a^2+ab+b^2) = (a^3+b^3)(a^3-b^3) = a^6 - b^6$
 (4)与式 $= \{(a+b)(a-b)\}^2(a^4+a^2b^2+b^4)^2 = \{(a^2-b^2)(a^4+a^2b^2+b^4)\}^2 = (a^6-b^6)^2 = a^{12} - 2a^6b^6 + b^{12}$
 (5)与式 $= (x^3+1)(x^6-x^3+1) = x^9+1$
 (6)与式 $= (x^2-1)(x^4+x^2+1)(x^6-4) = (x^6-1)(x^6-4) = x^{12} - 5x^6 + 4$
 24 (1) $(x+3)(x^2-3x+9)$ (2) $(x-4)(x^2+4x+16)$ (3) $(2x+1)(4x^2-2x+1)$
 (4) $(2a-3b)(4a^2+6ab+9b^2)$ (5) $(xy-2)(x^2y^2+2xy+4)$ (6) $(2ab+5c)(4a^2b^2-10abc+25c^2)$
 (7)与式 $= (x+1)^3 + 2^3 = \{(x+1)+2\}\{(x+1)^2-2(x+1)+2^2\} = (x+3)(x^2+3)$
 (8)与式 $= a\{(4b)^3 - (3a)^3\} = a(4b-3a)(16b^2+12ab+9a^2)$

25 (1) 与式 $= x^3 - 3 \cdot x^2 \cdot 2 + 3 \cdot x \cdot 2^2 - 2^3 = (x-2)^3$

[別解] 与式 $= x^3 - 8 - 6x^2 + 12x = (x-2)(x^2 + 2x + 4) - 6x(x-2) = (x-2)(x^2 + 2x + 4 - 6x)$
 $= (x-2)(x^2 - 4x + 4) = (x-2)^3$

(2) $(x+3)^3$ (3) $(2a+b)^3$ (4) $(3x-2y)^3$

26 (1) $3ab(a+b)$

(2) $a^3 + b^3 + c^3 - 3abc = (a+b)^3 - 3ab(a+b) + c^3 - 3abc = (a+b)^3 + c^3 - 3ab(a+b+c)$

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

$= (a+b+c)(a^2 + 2ab + b^2 - ac - bc + c^2 - 3ab) = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)$

(3) 与式 $= x^3 + (-y)^3 + (-2z)^3 - 3x \cdot (-y) \cdot (-2z) = (x-y-2z)(x^2 + y^2 + 4z^2 + xy - 2yz + 2zx)$

(4) 与式 $= x^3 + y^3 + (-1)^3 - 3xy \cdot (-1) = (x+y-1)(x^2 + y^2 - xy + x + y + 1)$

P 9 [混合問題]

1 (1) $3A - 2B + C = 3(2x + y + 3z) - 2(-3x + 2y - z) + (x - 3y - 2z) = 13x - 4y + 9z$

(2) 与式 $= 2A - B - 2C = 2(2x + y + 3z) - (-3x + 2y - z) - 2(x - 3y - 2z) = 5x + 6y + 11z$

2 (1) $4x^2 + 28xy + 49y^2$ (2) $16a^2b^2 - 9c^2$ (3) $a^3 + 2a^2 - 24a$

(4) 与式 $= \{2x - (y-1)\} \{2x + (y-1)\} = (2x)^2 - (y-1)^2 = 4x^2 - y^2 + 2y - 1$

(5) 与式 $= \{(a^2 + 2a) - 3\} \{(a^2 + 2a) - 8\} = (a^2 + 2a)^2 - 11(a^2 + 2a) + 24 = a^4 + 4a^3 - 7a^2 - 22a + 24$

(6) 与式 $= (a^2 - b^2)(a^2 + b^2)(a^4 + b^4) = (a^4 - b^4)(a^4 + b^4) = a^8 - b^8$

(7) 与式 $= \{(x+1)(x-1)(x^2+1)\}^2 = \{(x^2-1)(x^2+1)\}^2 = (x^4-1)^2 = x^8 - 2x^4 + 1$

(8) 与式 $= (x+1)(x-6)(x+2)(x-3) = (x^2-5x-6)(x^2-x-6) = \{(x^2-6)-5x\} \{(x^2-6)-x\}$
 $= (x^2-6)^2 - 6x(x^2-6) + 5x^2 = x^4 - 12x^2 + 36 - 6x^3 + 36x + 5x^2 = x^4 - 6x^3 - 7x^2 + 36x + 36$

3 (1) $a(a+5)^2$ (2) $(2x-3y)(5x+y)$ (3) $(3x+4y)(3x-4y)(9x^2+16y^2)$

(4) 与式 $= (x^2-4)(x^2-9) = (x+2)(x-2)(x+3)(x-3)$

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

(6) 与式 $= 4x^2 - 4x + 1 - y^2 = (2x-1)^2 - y^2 = (2x+y-1)(2x-y-1)$

(7) 与式 $= x^2(x-1) - (x-1) = (x-1)(x^2-1) = (x-1)^2(x+1)$

(8) $x^2 + x = X$ とおくと,

与式 $= 2X^2 - 7X - 30 = (X-6)(2X+5) = (x^2+x-6)(2x^2+2x+5) = (x+3)(x-2)(2x^2+2x+5)$

(9) 与式 $= b(a^2 - 2ab + b^2) - c(a-b) = b(a-b)^2 - c(a-b) = (a-b)(ab - b^2 - c)$

(10) 与式 $= x^2 + (3y+1)x + 2y^2 + 5y - 12 = x^2 + (3y+1)x + (y+4)(2y-3) = (x+y+4)(x+2y-3)$

4 (1) $27x^3 - 108x^2 + 144x - 64$

(2) 与式 $= \{(x+y)(x^2-xy+y^2)\}^3 = (x^3+y^3)^3 = x^9 + 3x^6y^3 + 3x^3y^6 + y^9$

(3) 与式 $= (x-1)(x^2+x+1)(x-2)(x^2+2x+4) = (x^3-1)(x^3-8) = x^6 - 9x^3 + 8$

(4) 与式 $= (x^3-1)^2 = \{(x-1)(x^2+x+1)\}^2 = (x-1)^2(x^2+x+1)^2$

(5) 与式 $= (a^3+b^3)(a^3-8b^3) = (a+b)(a-2b)(a^2-ab+b^2)(a^2+2ab+4b^2)$

(6) 与式 $= a^3 - 3 \cdot a^2 \cdot 2b + 3 \cdot a \cdot (2b)^2 - (2b)^3 = (a-2b)^3$

5 (1) 与式 $= \{x^3-3-(x^2+x)\} \{x^3-3+4(x^2+x)\} = (x^3-3)^2 + 3(x^2+x)(x^3-3) - 4(x^2+x)^2$
 $= (x^6-6x^3+9) + 3(x^5+x^4-3x^2-3x) - 4(x^4+2x^3+x^2) = x^6+3x^5-x^4-14x^3-13x^2-9x+9$

(2) 与式 $= (a-b)\{x^2-(a+b)x+ab\} + (b-c)\{x^2-(b+c)x+bc\} + (c-a)\{x^2-(c+a)x+ca\}$
 $= \{(a-b)+(b-c)+(c-a)\}x^2 - \{(a^2-b^2)+(b^2-c^2)+(c^2-a^2)\}x + ab(a-b) + bc(b-c) + ca(c-a)$
 $= a^2b - ab^2 + b^2c - bc^2 + c^2a - ca^2$

6 (1) 与式 $= b^3 + 2b^2 + b + a(b^2 + 2b + 1) = b(b^2 + 2b + 1) + a(b^2 + 2b + 1) = (b+a)(b^2 + 2b + 1)$
 $= (a+b)(b+1)^2$

(2) 与式 $= (b+c)(a+b)(a+c) + abc = (b+c)\{a^2 + (b+c)a + bc\} + abc$

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

$= \{a + (b+c)\} \{(b+c)a + bc\} = (a+b+c)(ab+bc+ca)$

$$\begin{array}{rcl} 1 & \begin{array}{c} b+c \\ b+c \end{array} & \longrightarrow (b+c)^2 \\ & \begin{array}{c} \diagdown \diagup \\ \diagup \diagdown \end{array} & \\ b+c & bc & \longrightarrow bc \\ & & \hline & & (b+c)^2 + bc \end{array}$$

(3) 与式 $= (x-3)(x+4)(x-1)(x+2) + 16 = (x^2+x-12)(x^2+x-2) + 16$ ここで, $x^2+x=X$ とおくと,
 与式 $= (X-12)(X-2) + 16 = X^2 - 14X + 40 = (X-4)(X-10) = (x^2+x-4)(x^2+x-10)$

$$(4) \text{与式} = 9a^4 + 24a^2 + 16 - 16a^2 = (3a^2 + 4)^2 - 16a^2 = (3a^2 + 4a + 4)(3a^2 - 4a + 4)$$

$$(5) \text{与式} = (xy - x - 2y + 2) + (xy - 2y - x + 2)z = (xy - 2y - x + 2)(z + 1) = \{(x - 2)y - (x - 2)\}(z + 1) \\ = (x - 2)(y - 1)(z + 1)$$

$$(6) \text{与式} = a^4 - 2(b^2 + c^2)a^2 + (b^2 - c^2)^2 = a^4 - 2(b^2 - c^2)a^2 + (b^2 - c^2)^2 - 4a^2c^2 \\ = \{a^2 - (b^2 - c^2)\}^2 - (2ac)^2 = (a^2 + 2ac + c^2 - b^2)(a^2 - 2ac + c^2 - b^2) \\ = \{(a + c)^2 - b^2\}\{(a - c)^2 - b^2\} = (a + b + c)(a - b + c)(a + b - c)(a - b - c)$$

$$(7) x - y = X, \quad y - z = Y, \quad z - x = Z \text{ とおくと,}$$

$$X^3 + Y^3 + Z^3 - 3XYZ = (X + Y + Z)(X^2 + Y^2 + Z^2 - XY - YZ - ZX)$$

ここで, $X + Y + Z = 0$ であるから, $X^3 + Y^3 + Z^3 = 3XYZ$ が成り立つ.

$$\text{ゆえに, } (x - y)^3 + (y - z)^3 + (z - x)^3 = 3(x - y)(y - z)(z - x)$$

2 実数

P10

$$1 \quad (1) \frac{25}{5}, (\sqrt{7})^2 \quad (2) -4, 0, \frac{25}{5}, -\sqrt{16}, (\sqrt{7})^2 \quad (3) -4, 0, \frac{25}{5}, \frac{9}{4}, -\frac{9}{16}, -\sqrt{16}, (\sqrt{7})^2, 1.2\dot{3}$$

$$(4) \sqrt{5}, \frac{\pi}{2}$$

$$2 \quad (1) 0.\dot{2} \quad (2) 0.\dot{3}\dot{6} \quad (3) 0.\dot{1}3\dot{5}$$

$$(4) x = 0.\dot{7} \cdots \cdots \textcircled{1} \text{とおくと, } 10x = 7.\dot{7} \cdots \cdots \textcircled{2} \quad \textcircled{2} - \textcircled{1} \text{より, } 9x = 7, \quad x = \frac{7}{9}$$

$$(5) x = 0.4\dot{2}9 \cdots \cdots \textcircled{1} \text{とおくと, } 1000x = 429.4\dot{2}9 \cdots \cdots \textcircled{2} \quad \textcircled{2} - \textcircled{1} \text{より, } 999x = 429, \quad x = \frac{143}{333}$$

$$(6) x = 0.3\dot{5}\dot{7} \text{とおくと, } 10x = 3.\dot{5}\dot{7} \cdots \cdots \textcircled{1}, \quad 1000x = 357.\dot{5}\dot{7} \cdots \cdots \textcircled{2} \quad \textcircled{2} - \textcircled{1} \text{より, } 990x = 354, \quad x = \frac{59}{165}$$

$$3 \quad (1) 8 \quad (2) 3.4 \quad (3) \frac{7}{5} \quad (4) 6 \quad (5) 7 \quad (6) \frac{11}{6} \quad (7) \sqrt{10} - 3 \quad (8) 4 - \pi \quad 4 \quad (1) 2 - x \quad (2) x - 2$$

$$5 \quad (1) -a - (a - 3) = 3 - 2a \quad (2) a - (a - 3) = 3 \quad (3) a + (a - 3) = 2a - 3$$

P11

$$6 \quad (1) ab \geq 0 \text{より, } |ab| = ab, \quad |a| = a, \quad |b| = b \text{より, } |a||b| = ab \text{ ゆえに, 等式が成り立つ.}$$

$$(2) ab \leq 0 \text{より, } |ab| = -ab, \quad |a| = -a, \quad |b| = b \text{より, } |a||b| = -ab \text{ ゆえに, 等式が成り立つ.}$$

$$(3) ab > 0 \text{より, } |ab| = ab, \quad |a| = -a, \quad |b| = -b \text{より, } |a||b| = ab \text{ ゆえに, 等式が成り立つ.}$$

$$7 \quad (1) a \geq 0 \text{のとき, } -a \leq 0 \text{よって, } |a| = a \geq 0 \geq -a \text{より, 成り立つ.}$$

$$a < 0 \text{のとき, } |a| = -a \text{より, 等号が成り立つ.}$$

$$(2) a \geq 0 \text{のとき, } |a| = a \text{より, } |a|^2 = a^2 \quad a < 0 \text{のとき, } |a| = -a \text{より, } |a|^2 = (-a)^2 = a^2$$

$$8 \quad \text{まず, } \left| \frac{1}{b} \right| = \frac{1}{|b|} \text{ が成り立つことを示す.}$$

$$(i) b > 0 \text{のとき, } \frac{1}{b} > 0 \text{より, } \left| \frac{1}{b} \right| = \frac{1}{b} \text{ また, } \frac{1}{|b|} = \frac{1}{b} \text{ であるから, 成り立つ.}$$

$$(ii) b < 0 \text{のとき, } \frac{1}{b} < 0 \text{より, } \left| \frac{1}{b} \right| = -\frac{1}{b} \text{ また, } \frac{1}{|b|} = -\frac{1}{b} \text{ であるから, この場合も成り立つ.}$$

$$(i), (ii) \text{より, } \left| \frac{1}{b} \right| = \frac{1}{|b|} \text{ が成り立つ.}$$

$$\text{ゆえに, } \left| \frac{a}{b} \right| = \left| a \cdot \frac{1}{b} \right| = |a| \left| \frac{1}{b} \right| = |a| \cdot \frac{1}{|b|} = \frac{|a|}{|b|} \text{ となり, 与えられた等式が成り立つ.}$$

$$9 \quad (1) \pm 7 \quad (2) \pm 12 \quad (3) \pm \frac{4}{3} \quad (4) \pm \sqrt{15} \quad (5) \pm \sqrt{33} \quad 10 \quad \sqrt{4^2} = 4, \sqrt{(-5)^2} = 5, (\sqrt{6})^2 = 6$$

$$11 \quad (1) 3\sqrt{3} \quad (2) 2\sqrt{5} \quad (3) 4\sqrt{2} \quad (4) 5\sqrt{3} \quad (5) 4\sqrt{7} \quad 12 \quad (1) 1 - x \quad (2) x - 1$$