

数学 I 休校中の課題解答〔1 - 7 追加分〕①

(1 章 1 節)

- ① ノートに問題を解いた後、丸付けをしてください。
 ② 解説を読んで考え方を確認し、間違えた原因や分からないこと、ポイント等をメモし、授業が始まったときに活かせるようにしましょう。
 ☆登校日 5 / 13 (水) にノートとスタディを提出してください。

教 p. 11

【問 1】《解答》

- (1) $(x+1)(x^2-x+1) = (x+1)(x^2-x\cdot 1+1^2) = x^3+1^3 = x^3+1$
 (2) $(x-2)(x^2+2x+4) = (x-2)(x^2+x\cdot 2+2^2) = x^3-2^3 = x^3-8$

【問 2】《解答》

- (1) $(x+2)^3 = x^3+3\cdot x^2\cdot 2+3\cdot x\cdot 2^2+2^3 = x^3+6x^2+12x+8$
 (2) $(2x-1)^3 = (2x)^3-3\cdot (2x)^2\cdot 1+3\cdot 2x\cdot 1^2-1^3 = 8x^3-12x^2+6x-1$
 (3) $(x+2y)^3 = x^3+3\cdot x^2\cdot 2y+3\cdot x\cdot (2y)^2+(2y)^3 = x^3+6x^2y+12xy^2+8y^3$

教 p. 18

【問 1】《解答》

- (1) $8x^3+y^3 = (2x)^3+y^3 = (2x+y)\{(2x)^2-2x\cdot y+y^2\} = (2x+y)(4x^2-2xy+y^2)$
 (2) $x^3+125 = x^3+5^3 = (x+5)(x^2-x\cdot 5+5^2) = (x+5)(x^2-5x+25)$
 (3) $x^3-27y^3 = x^3-(3y)^3 = (x-3y)\{x^2+x\cdot 3y+(3y)^2\} = (x-3y)(x^2+3xy+9y^2)$

教 p. 19

【1】《解答》

$$x^2-2x+1+2x^2+3x-4 = (x^2+2x^2)+(-2x+3x)+(1-4) = (1+2)x^2+(-2+3)x-3 = 3x^2+x-3$$

【2】《解答》

- (1) $A+B = (3x^2+5x-6)+(x^2-3x+2) = 3x^2+5x-6+x^2-3x+2 = (3x^2+x^2)+(5x-3x)+(-6+2) = 4x^2+2x-4$
 $A-B = (3x^2+5x-6)-(x^2-3x+2) = 3x^2+5x-6-x^2+3x-2 = (3x^2-x^2)+(5x+3x)+(-6-2) = 2x^2+8x-8$
 $A-2B = (3x^2+5x-6)-2(x^2-3x+2) = 3x^2+5x-6-2x^2+6x-4 = (3x^2-2x^2)+(5x+6x)+(-6-4) = x^2+11x-10$
 (2) $A+B = (-x^2+2x+1)+(2x^2-3x+2) = -x^2+2x+1+2x^2-3x+2 = (-x^2+2x^2)+(2x-3x)+(1+2) = x^2-x+3$
 $A-B = (-x^2+2x+1)-(2x^2-3x+2) = -x^2+2x+1-2x^2+3x-2 = (-x^2-2x^2)+(2x+3x)+(1-2) = -3x^2+5x-1$
 $A-2B = (-x^2+2x+1)-2(2x^2-3x+2) = -x^2+2x+1-4x^2+6x-4 = (-x^2-4x^2)+(2x+6x)+(1-4) = -5x^2+8x-3$

【3】《解答》

- (1) $2x^3 \times (-x^2) = \{2 \times (-1)\} \times (x^3 \times x^2) = -2x^5$
 (2) $(-3x^2)^4 = (-3)^4 \times (x^2)^4 = 81x^8$

【4】《解答》

- (1) $-2x(3x^2-x+4) = -2x\cdot 3x^2-2x\cdot(-x)-2x\cdot 4 = -6x^3+2x^2-8x$
 (2) $(x^2+2x-3) \times (-4x) = x^2\cdot(-4x)+2x\cdot(-4x)+(-3)\cdot(-4x) = -4x^3-8x^2+12x$
 (3) $(2x-3)(x^2+4x-1) = 2x(x^2+4x-1)-3(x^2+4x-1) = 2x^3+8x^2-2x-3x^2-12x+3 = 2x^3+5x^2-14x+3$
 (4) $(x^2-2x+3)(3x-4) = x^2(3x-4)-2x(3x-4)+3(3x-4) = 3x^3-4x^2-6x^2+8x+9x-12 = 3x^3-10x^2+17x-12$

【5】《解答》

- (1) $(3x-4)^2 = (3x)^2-2\cdot 3x\cdot 4+4^2 = 9x^2-24x+16$
 (2) $(2x+5y)(2x-5y) = (2x)^2-(5y)^2 = 4x^2-25y^2$
 (3) $(x+3y)(x-4y) = x^2+\{3y+(-4y)\}x+3y\cdot(-4y) = x^2-xy-12y^2$
 (4) $(3x+4y)(2x-3y) = (3\cdot 2)x^2+\{3\cdot(-3y)+4y\cdot 2\}x+4y\cdot(-3y) = 6x^2-xy-12y^2$
 (5) $a+b = A$ とおくと
 $(a+b-2)(a+b+1) = (A-2)(A+1) = A^2-A-2 = (a+b)^2-(a+b)-2 = a^2+2ab+b^2-a-b-2$
 (6) $a-b = A$ とおくと
 $(a-b-1)^2 = (A-1)^2 = A^2-2A+1 = (a-b)^2-2(a-b)+1 = a^2-2ab+b^2-2a+2b+1$

【6】《解答》

- (1) $2x^2y+4xy = 2xy\cdot x+2xy\cdot 2 = 2xy(x+2)$
 (2) $4x^2+20x+25 = (2x)^2+2\cdot 2x\cdot 5+5^2 = (2x+5)^2$
 (3) $16x^2-9y^2 = (4x)^2-(3y)^2 = (4x+3y)(4x-3y)$
 (4) 積が $-6y^2$, 和が $-y$ となる 2 つの式は $2y$ と $-3y$ であるから
 $x^2-xy-6y^2 = (x+2y)(x-3y)$
 (5) $3x^2+5x-12 = (x+3)(3x-4)$

$$\begin{array}{r} 1 \times 3 \longrightarrow 9 \\ 3 \times -4 \longrightarrow -12 \\ \hline \end{array}$$

数学 I 休校中の課題解答〔1 - 7 追加分〕②

(1章1節～2節)

$$\begin{aligned} (6) \quad & 3x^2 - 2xy - 8y^2 \\ &= 3x^2 - 2y \cdot x - 8y^2 \\ &= (x - 2y)(3x + 4y) \end{aligned}$$

$$\begin{array}{r} 1 \times -2y \longrightarrow -6y \\ 3 \times 4y \longrightarrow 4y \\ \hline -2y \end{array}$$

【7】《解答》

$$\begin{aligned} (1) \quad & x + y = A \text{ とおくと} \\ & (x + y)^2 - 5(x + y) + 6 = A^2 - 5A + 6 = (A - 2)(A - 3) \\ &= (x + y - 2)(x + y - 3) \end{aligned}$$

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

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

$$\begin{aligned} (4) \quad & x^2 - 4xy + 3y^2 + 3x - 5y + 2 \\ &= x^2 - (4y - 3)x + (3y^2 - 5y + 2) \\ &= x^2 - (4y - 3)x + (y - 1)(3y - 2) \\ &= \{x - (y - 1)\}\{x - (3y - 2)\} \\ &= (x - y + 1)(x - 3y + 2) \end{aligned}$$

$$\begin{array}{r} 1 \times -(y-1) \longrightarrow -y+1 \\ 1 \times -(3y-2) \longrightarrow -3y+2 \\ \hline -4y+3 \end{array}$$

教 p. 26

【1】《解答》

- $3 > 0$ であるから $|3| = 3$
- $-5 < 0$ であるから $|-5| = -(-5) = 5$
- $\sqrt{2} - 2 < 0$ であるから $|\sqrt{2} - 2| = -(\sqrt{2} - 2) = 2 - \sqrt{2}$

【2】《解答》

- $\sqrt{13}$, $-\sqrt{13}$
- $\sqrt{1} = 1$, $-\sqrt{1} = -1$

【3】《解答》

- $(\sqrt{5})^2 = 5$
- $(-\sqrt{7})^2 = 7$

【4】《解答》

- $\sqrt{6} \times \sqrt{10} = \sqrt{6 \times 10} = \sqrt{2 \times 3 \times 2 \times 5} = \sqrt{2^2 \times 15} = 2\sqrt{15}$
- $\frac{\sqrt{10}}{\sqrt{5}} = \sqrt{\frac{10}{5}} = \sqrt{2}$

【5】《解答》

- $5\sqrt{7} + \sqrt{63} - \sqrt{28} = 5\sqrt{7} + \sqrt{3^2 \times 7} - \sqrt{2^2 \times 7}$
 $= 5\sqrt{7} + 3\sqrt{7} - 2\sqrt{7}$
 $= (5 + 3 - 2)\sqrt{7} = 6\sqrt{7}$
- $\sqrt{12} - \sqrt{75} + \sqrt{48} = \sqrt{2^2 \times 3} - \sqrt{5^2 \times 3} + \sqrt{4^2 \times 3}$
 $= 2\sqrt{3} - 5\sqrt{3} + 4\sqrt{3}$
 $= (2 - 5 + 4)\sqrt{3} = \sqrt{3}$
- $\sqrt{18} + \sqrt{12} - \sqrt{32} = \sqrt{3^2 \times 2} + \sqrt{2^2 \times 3} - \sqrt{4^2 \times 2}$
 $= 3\sqrt{2} + 2\sqrt{3} - 4\sqrt{2}$
 $= (3 - 4)\sqrt{2} + 2\sqrt{3} = -\sqrt{2} + 2\sqrt{3}$
- $(2\sqrt{3} - \sqrt{2})(\sqrt{3} + 2\sqrt{2})$
 $= 2(\sqrt{3})^2 + 2\sqrt{3} \times 2\sqrt{2} - \sqrt{2} \times \sqrt{3} - 2(\sqrt{2})^2$
 $= 6 + 4\sqrt{6} - \sqrt{6} - 4 = 2 + 3\sqrt{6}$
- $(\sqrt{5} + \sqrt{2})^2 = (\sqrt{5})^2 + 2 \times \sqrt{5} \times \sqrt{2} + (\sqrt{2})^2$
 $= 5 + 2\sqrt{10} + 2 = 7 + 2\sqrt{10}$
- $(5 + 2\sqrt{3})(5 - 2\sqrt{3}) = 5^2 - (2\sqrt{3})^2 = 25 - 12 = 13$

【6】《解答》

- $\frac{2}{\sqrt{6}} = \frac{2 \times \sqrt{6}}{\sqrt{6} \times \sqrt{6}} = \frac{2\sqrt{6}}{6} = \frac{\sqrt{6}}{3}$
- $\frac{\sqrt{5}}{\sqrt{8}} = \frac{\sqrt{5}}{2\sqrt{2}} = \frac{\sqrt{5} \times \sqrt{2}}{2\sqrt{2} \times \sqrt{2}} = \frac{\sqrt{10}}{4}$

$$(3) \quad \frac{1}{\sqrt{5} + \sqrt{2}} = \frac{1 \times (\sqrt{5} - \sqrt{2})}{(\sqrt{5} + \sqrt{2})(\sqrt{5} - \sqrt{2})} = \frac{\sqrt{5} - \sqrt{2}}{5 - 2} = \frac{\sqrt{5} - \sqrt{2}}{3}$$

$$(4) \quad \frac{\sqrt{2}}{\sqrt{3} - \sqrt{2}} = \frac{\sqrt{2}(\sqrt{3} + \sqrt{2})}{(\sqrt{3} - \sqrt{2})(\sqrt{3} + \sqrt{2})} = \frac{\sqrt{2}(\sqrt{3} + \sqrt{2})}{3 - 2} = \frac{\sqrt{6} + 2}{1} = 2 + \sqrt{6}$$

$$(5) \quad \frac{\sqrt{2} - 1}{\sqrt{2} + 1} = \frac{(\sqrt{2} - 1)^2}{(\sqrt{2} + 1)(\sqrt{2} - 1)} = \frac{2 - 2\sqrt{2} + 1}{2 - 1} = \frac{3 - 2\sqrt{2}}{1} = 3 - 2\sqrt{2}$$

$$\begin{aligned} (6) \quad & \frac{\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}} = \frac{(\sqrt{5} + \sqrt{3})^2}{(\sqrt{5} - \sqrt{3})(\sqrt{5} + \sqrt{3})} = \frac{5 + 2\sqrt{15} + 3}{5 - 3} = \frac{8 + 2\sqrt{15}}{2} = \frac{2(4 + \sqrt{15})}{2} \\ &= 4 + \sqrt{15} \end{aligned}$$

教 p. 27

【問1】《解答》

- $\sqrt{6 + 2\sqrt{5}} = \sqrt{(5 + 1) + 2\sqrt{5 \times 1}} = \sqrt{5} + 1$
- $\sqrt{9 - 2\sqrt{14}} = \sqrt{(7 + 2) - 2\sqrt{7 \times 2}} = \sqrt{7} - \sqrt{2}$
- $\sqrt{4 + \sqrt{12}} = \sqrt{4 + 2\sqrt{3}} = \sqrt{(3 + 1) + 2\sqrt{3 \times 1}} = \sqrt{3} + 1$
- $\sqrt{7 - 4\sqrt{3}} = \sqrt{7 - 2\sqrt{12}} = \sqrt{(4 + 3) - 2\sqrt{4 \times 3}} = \sqrt{4} - \sqrt{3}$
 $= 2 - \sqrt{3}$