

2002年度 基礎数学ワークブック

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高知工科大学
基礎数学ワークブック
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Series A

No. 1

解答

< 1 ページ. 省略記号の変更 >

問1の解答

$$(1) 3 \times x + x + x = 5x$$

$$(2) 2 \times x \times x \times 3 \times y \times y \times y \times y \times y = 6x^2y^5$$

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

$$(4) 3 \times x \times x \times (x \times 4 - 3 \times y) = 12x^3 - 9x^2y$$

問2の解答

$$(1) 1\frac{1}{3} = \frac{4}{3}$$

$$(2) 3\frac{3}{4} = \frac{15}{4}$$

$$(3) 4\frac{1}{5} = \frac{21}{5}$$

$$(4) 6\frac{2}{3} = \frac{20}{3}$$

< 2 ページ. 文字式の決まり >

問の解答

$$(1) 3 \times a \times b \times x \times a \times b \times 2 \times b = 6a^2b^3x$$

$$(2) 5(x - y) - 3(y + 2x) + x(2 + y) = x - 8y + xy$$

$$(3) 6 \times x \times y \times y \div (x \times y \times 5 \times x \times 3) = \frac{2y}{5x}$$

$$(4) 21ab^3 \div 28a^2b = \frac{3b^2}{4a}$$

$$(5) (5xy^2) \times (9x^3y^2) \div (15x^2y^3) = 3x^2y$$

$$(6) (3ab^2c) \div (2a^2bc^3) \times (6abc^2) = 9b^2$$

< 3 ページ. 通分 >

問の解答

$$(1) \frac{7}{6} - \frac{7}{8} = \frac{7}{24}$$

$$(2) \frac{2}{9} + \frac{5}{12} = \frac{23}{36}$$

$$(3) \frac{5}{4} - \frac{7}{8} = \frac{3}{8}$$

$$(4) \frac{x}{3} + \frac{y}{2} = \frac{2x + 3y}{6}$$

$$(5) \frac{a}{12} - \frac{b}{8} = \frac{2a - 3b}{24}$$

$$(6) \frac{x}{2} + \frac{y}{6} = \frac{3x + y}{6}$$

$$(7) \frac{y}{x} - \frac{a}{3} = \frac{3y - ax}{3x}$$

$$(8) \frac{b}{a} + \frac{d}{c} = \frac{bc + ad}{ac}$$

$$(9) \frac{1}{x} + \frac{1}{y} + \frac{1}{z} = \frac{yz + zx + xy}{xyz}$$

< 4 ページ. 分数の簡略化 >

問の解答

$$(1) \frac{\frac{1}{7}}{\frac{5}{7}} = \frac{5}{7}$$

$$(2) \frac{\frac{2}{3}}{\frac{4}{9}} = \frac{3}{2}$$

$$(3) \frac{\frac{2}{3} - \frac{1}{2}}{\frac{2}{3} + \frac{1}{2}} = \frac{1}{7}$$

$$(4) \frac{1}{\frac{1}{2} + \frac{1}{3} + \frac{1}{4}} = \frac{12}{13}$$

$$(5) \frac{\frac{d}{c}}{\frac{b}{a}} = \frac{ad}{bc}$$

$$(6) \frac{1}{\frac{zw}{xy}} = \frac{xy}{zw}$$

$$(7) \frac{1}{\frac{y}{x} + \frac{w}{z}} = \frac{xz}{yz + wx}$$

$$(8) \frac{\frac{1}{ac}}{\frac{b}{a} - \frac{d}{c}} = \frac{1}{bc - ad}$$

$$(9) \frac{1}{\frac{1}{a} + \frac{1}{b} + \frac{1}{c}} = \frac{abc}{bc + ca + ab}$$

< 5 ページ. 等式の変形 >

問の解答

$$(1) R = \frac{E}{I}$$

$$(2) r^2 = \frac{S}{\pi}$$

$$(3) h = \frac{2E}{a+b}$$

$$(4) N = 9.74 \times 10^5 \times \frac{P}{T}$$

$$(5) \alpha = \frac{\sigma}{E(t-\tau)}$$

$$(6) E = 2(1+\mu)G$$

$$(7) a = \frac{bR}{b+R}$$

$$(8) R = \frac{abc}{bc+ac+ab}$$

< 6 ページ. 単位の計算 1 >

問 1 の解答

(1) $123\text{m} = \boxed{0.123} \text{ km}$

(2) $7500\text{mm} = \boxed{7.5} \text{ m}$

(3) $1\text{mm} = \boxed{1000000} \text{ \AA} (= \boxed{10^7} \text{ \AA})$

問 2 の解答

(1) $10.5\text{m} + 2.4\text{m} = 12.9\text{m}$

(2) $2000\text{m} - 140\text{m} = 1860\text{m}$

問 3 の解答

(1) $0.6\text{min} = \boxed{36} \text{ s}$

(2) $36\text{s} = \boxed{\frac{1}{100}} \text{ h} (= \boxed{0.01} \text{ h})$

(3) $1\text{h} = \boxed{3600} \text{ h}$

(4) $156\text{s} = \boxed{2.6} \text{ min}$

(5) $2.3\text{h} = \boxed{138} \text{ min}$

(6) $15\text{min} = \boxed{0.25} \text{ h}$

< 7 ページ. 単位の計算 2 >

問 1 の解答

(1) $1\text{m}^2 = \boxed{10000}\text{cm}^2 (= \boxed{10^4}\text{cm}^2)$

(2) $1\text{km}^2 = \boxed{1000000}\text{m}^2 (= \boxed{10^6}\text{cm}^2)$

(3) $0.5\text{cm}^2 = \boxed{50}\text{mm}^2$

(4) $600\text{mm}^2 = \boxed{0.0006}\text{m}^2 (= \boxed{6 \times 10^{-4}}\text{m}^2)$

問 2 の解答

(1) $1\text{cm}^3 = \boxed{1000}\text{mm}^3$

(2) $1\text{m}^3 = \boxed{1000000}\text{cm}^3 (= \boxed{10^6}\text{cm}^3)$

(3) $1\text{m}^3 = \boxed{1000000000}\text{mm}^3 (= \boxed{10^9}\text{mm}^3)$

(4) $0.001\text{km}^3 = \boxed{1000000}\text{m}^3 (= \boxed{10^6}\text{m}^3)$

< 8 ページ. 単位の計算 3 >**問 1 の解答**

$$18\text{km/h} = \boxed{300}\text{ m/min} = \boxed{5}\text{ m/s}$$

問 2 の解答

$$\frac{5}{6}\text{m/s} = 3\text{km/h} \quad (\text{時速 } 3\text{km})$$

問 3 の解答

$$\frac{54}{99}\text{km/min} = \frac{100}{11}\text{m/s}$$

(答) 100m を 11 秒で走る

< 9 ページ. 文字式の展開 1 >

問の解答

$$(1) (a - b)^2 = a^2 - 2ab + b^2$$

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

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

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

$$(5) (a + b)(-a + b) = b^2 - a^2$$

$$(6) (a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$$

$$(7) (a + b - c)^2 = a^2 + b^2 + c^2 + 2ab - 2bc - 2ca$$

$$(8) (a - b - c)^2 = a^2 + b^2 + c^2 - 2ab + 2bc - 2ca$$

< 10 ページ. 文字式の展開 2 >

問の解答

$$(1) (a+b)(a^2-ab+b^2) = a^3 - a^2b + ab^2 + a^2b - ab^2 + b^3 = a^3 + b^3$$

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

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

$$(4) (a^2-b^2)(a^2+b^2) = a^4 - b^4$$

$$(5) (a-b)^2(a+b)^2 = (a^2-b^2)(a^2-b^2) = a^4 - 2a^2b^2 + b^4$$

< 11 ページ. ピタゴラスの定理 >

問の解答

図 5 より、 $(a + b)^2 = c^2 + \left(\frac{1}{2}ab\right) \times 4$ であるから、

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

よって、 $c^2 = a^2 + b^2$ が成り立つ。

< 12 ページ. 平方根 1 >

問 1 の解答

- (1) 4 (2) 16 (3) $\frac{6}{7}$ (4) 0.5

問 2 の解答

$$OD = \sqrt{(OC)^2 + (CD)^2} = \sqrt{3+1} = 2$$

同様に $OE = \sqrt{4+1} = \sqrt{5}$

$$OF = \sqrt{5+1} = \sqrt{6}$$

$$OG = \sqrt{6+1} = \sqrt{7}$$

< 13 ページ. 平方根 2 >

問1の解答

$$(1) (6\sqrt{3} - 2\sqrt{2}) + (3\sqrt{2} - 5\sqrt{3}) = \sqrt{3} + \sqrt{2}$$

$$(2) (5\sqrt{2} - 2\sqrt{3}) - (3\sqrt{3} - \sqrt{2}) = 6\sqrt{2} - 5\sqrt{3}$$

$$(3) 3(\sqrt{5} + 2\sqrt{3}) + 2(2\sqrt{5} - 3\sqrt{3}) = 7\sqrt{5}$$

$$(4) 5(\sqrt{5} + \sqrt{3}) - 3(2\sqrt{5} - \sqrt{2}) = 3\sqrt{2} + 5\sqrt{3} - \sqrt{5}$$

問2の解答

$$(1) (-\sqrt{11})^2 = 11$$

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

$$(3) \left(-\sqrt{\frac{2}{3}}\right)^2 = \frac{2}{3}$$

$$(4) \sqrt{(-0.12)^2} = 0.12$$

問3の解答

$$(1) \sqrt{2} \times \sqrt{3} = \sqrt{6}$$

$$(2) \sqrt{5} \times \sqrt{7} = \sqrt{35}$$

$$(3) \sqrt{4} \times \sqrt{11} = 2\sqrt{11}$$

$$(4) \sqrt{3} \times \sqrt{12} = \sqrt{36} = 6$$

< 14 ページ. 平方根 3 >

問 1 の解答

$$(1) \sqrt{18} = 3\sqrt{2}$$

$$(2) \sqrt{40} = 2\sqrt{10}$$

$$(3) \sqrt{75} = 5\sqrt{3}$$

$$(4) \sqrt{80} = 4\sqrt{5}$$

$$(5) \sqrt{147} = 7\sqrt{3}$$

問 2 の解答

$$(1) \sqrt{5} \times \sqrt{20} = 10$$

$$(2) \sqrt{7} \times \sqrt{63} = 21$$

$$(3) \sqrt{21} \times \sqrt{84} = 42$$

問 3 の解答

$$(1) \frac{\sqrt{28}}{\sqrt{7}} = 2$$

$$(2) \frac{\sqrt{405}}{\sqrt{15}} = 3\sqrt{3}$$

$$(3) \frac{\sqrt{3} \times \sqrt{18}}{\sqrt{2}} = 3\sqrt{3}$$

< 15 ページ. 平方根 4 >

問1の解答

$$(1) (\sqrt{5} + \sqrt{2})^2 = 7 + 2\sqrt{10}$$

$$(2) (\sqrt{2} + \sqrt{6})^2 = 8 + 4\sqrt{3}$$

$$(3) (\sqrt{3} - \sqrt{2})^2 = 5 - 2\sqrt{6}$$

$$(4) (\sqrt{6} - \sqrt{3})^2 = 9 - 6\sqrt{2}$$

$$(5) (\sqrt{5} + \sqrt{2})(\sqrt{5} - \sqrt{2}) = 3$$

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

問2の解答

$$(1) \frac{\sqrt{2}}{\sqrt{3}} = \frac{\sqrt{6}}{3}$$

$$(2) \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$(3) \frac{3}{\sqrt{3}} = \sqrt{3}$$

$$(4) \frac{4}{\sqrt{12}} = \frac{2\sqrt{3}}{3}$$

$$(5) \frac{2}{\sqrt{18}} = \frac{\sqrt{2}}{3}$$

問3の解答

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

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

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

$$(4) \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}} = 5 - 2\sqrt{6}$$

< 16 ページ. 数の表示 1 >

問 1 の解答

$$(1) (12)_8 = (10)_{10}$$

$$(2) (33)_8 = (27)_{10}$$

$$(3) (234)_8 = (156)_{10}$$

$$(4) (707)_8 = (455)_{10}$$

$$(5) (2001)_8 = (1025)_{10}$$

問 2 の解答

$$(1) (21)_{10} = (25)_8$$

$$(2) (45)_{10} = (55)_8$$

$$(3) (79)_{10} = (117)_8$$

$$(4) (156)_{10} = (234)_8$$

問 3 の解答

$$(1) (3.14)_{10} = 3 + \frac{1}{10} + \frac{4}{10^2}$$

$$(2) (1.5)_8 = 1 + \frac{5}{8}$$

$$(3) (5.73)_8 = 5 + \frac{7}{8} + \frac{3}{8^2}$$

< 17 ページ. 数の表示 2 >

問 1 の解答

(証明)

$a + b + c$ は 3 の倍数だから $a + b + c = 3n$ (n は自然数) とおく。

$$\begin{aligned}(abc)_{10} &= 100a + 10b + c \\ &= 3(33a + 3b) + (a + b + c) \\ &= 3(33a + 3b + n)\end{aligned}$$

より、 $(abc)_{10} = 3 \times (33a + 3b + n)$ は 3 の倍数になる。(証明終)

問 2 の解答

(証明)

$a + b + c$ は 7 の倍数だから $a + b + c = 7n$ (n は自然数) とおく。

$$\begin{aligned}(abc)_8 &= 64a + 8b + c \\ &= 7(9a + b) + (a + b + c) \\ &= 7(9a + b + n)\end{aligned}$$

より、 $(abc)_8 = 7 \times (9a + b + n)$ は 7 の倍数になる。(証明終)

< 18 ページ. 整式 1 >

問 1 の解答

$$(abcd)_x = ax^3 + bx^2 + cx + d$$

問 2 の解答

$$(1) 2(3x - 4x^2 + 1) + 3(x - 5 + 2x^2) = -2x^2 + 9x - 13$$

$$(2) (3x - 1)(4 - 5x) = -15x^2 + 17x - 4$$

< 19 ページ. 整式 2 >

問1の解答

$$(1) (3x - x^2 + 4) + (2x^2 - 1 + 2x) = x^2 + 5x + 3$$

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

$$(3) (x - 3)(2 + x) = x^2 - x - 6$$

$$(4) (4x - 3)(6 - 5x) = 24x - 18 - 20x^2 + 15x \\ = -20x^2 + 39x - 18$$

問2の解答

$$(1) (x + a)^2 = x^2 + 2ax + a^2$$

$$(2) (x - a)^2 = x^2 - 2ax + a^2$$

$$(3) (x + a)(x - a) = x^2 - a^2$$

$$(4) (x - a)(x - b) = x^2 - (a + b)x + ab$$

$$(5) (x - a)(x^2 + ax + a^2) = x^3 - a^3$$

$$(6) (x - a)^3 = x^3 + 3ax^2 + 3a^2x + a^3$$

< 20 ページ. 整式の除法 >

問の解答

(1)

$$\frac{x^2 + 3x}{x + 1} = x + 2 - \frac{2}{x + 1}$$

$$\begin{array}{r} x+2 \\ x+1 \overline{) x^2+3x} \\ \underline{x^2+x} \\ 2x \\ \underline{2x+2} \\ -2 \end{array}$$

(2)

$$\frac{x^2 + 3x + 5}{x - 2} = x + 5 + \frac{15}{x - 2}$$

$$\begin{array}{r} x+5 \\ x-2 \overline{) x^2+3x+5} \\ \underline{x^2-2x} \\ 5x+5 \\ \underline{5x-10} \\ 15 \end{array}$$

(3)

$$\frac{2x^2 - 3x - 1}{x - 1} = 2x - 1 - \frac{2}{x - 1}$$

$$\begin{array}{r} 2x-1 \\ x-1 \overline{) 2x^2-3x-1} \\ \underline{2x^2-2x} \\ -x-1 \\ \underline{-x+1} \\ -2 \end{array}$$

(4)

$$\frac{x^3 - 5x^2 + 7x - 2}{x - 3} = x^2 - 2x + 1 + \frac{1}{x - 3}$$

$$\begin{array}{r} x^2-2x+1 \\ x-3 \overline{) x^3-5x^2+7x-2} \\ \underline{x^3-3x^2} \\ -2x^2+7x \\ \underline{-2x^2+6x} \\ x-2 \\ \underline{x-3} \\ 1 \end{array}$$

< 21 ページ. 方程式と恒等式 >

問1の解答

$$(1) x = 0 \text{ のとき } (x+2)(x+3) = 6, \quad x^2 + 5x + 6 = 6$$

$$(2) x = 1 \text{ のとき } (x+2)(x+3) = 12, \quad x^2 + 5x + 6 = 12$$

$$(3) x = 2 \text{ のとき } (x+2)(x+3) = 20, \quad x^2 + 5x + 6 = 20$$

$$(4) x = 3 \text{ のとき } (x+2)(x+3) = 30, \quad x^2 + 5x + 6 = 30$$

$$(5) x = 4 \text{ のとき } (x+2)(x+3) = 42, \quad x^2 + 5x + 6 = 42$$

問2の解答

$$(1) (x + \alpha)^2 = x^2 + 2\alpha x + \alpha^2$$

$$(2) (x - \alpha)^2 = x^2 - 2\alpha x + \alpha^2$$

$$(3) (x + \alpha)(x - \alpha) = x^2 - \alpha^2$$

$$(4) (x + \alpha)(x + \beta) = x^2 + (\alpha + \beta)x + \alpha\beta$$

$$(5) (x - \alpha)(x - \beta) = x^2 - (\alpha + \beta)x + \alpha\beta$$

$$(6) (x + \alpha)(x - \beta) = x^2 + (\alpha - \beta)x - \alpha\beta$$

問3の解答

(1) 方程式

(2) 恒等式

(3) 恒等式

(4) 方程式

< 22 ページ.2 次式の因数分解 1 >

問の解答

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

$$(2) x^2 - 10x + 25 = (x - 5)^2$$

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

$$(4) x^2 + 5x + 6 = (x + 2)(x + 3)$$

< 23 ページ.2 次式の因数分解 2 >

問の解答

$$(1) x^2 + 2\alpha x + \alpha^2 = (x + \alpha)^2$$

$$(2) x^2 - 2\alpha x + \alpha^2 = (x - \alpha)^2$$

$$(3) x^2 - \alpha^2 = (x + \alpha)(x - \alpha)$$

$$(4) x^2 - (\alpha + \beta)x + \alpha\beta = (x - \alpha)(x - \beta)$$

$$(5) x^2 + (\alpha - \beta)x - \alpha\beta = (x + \alpha)(x - \beta)$$

< 24 ページ.2 次式の因数分解 3 >

問の解答

$$(1) x^2 + 6x + 9 = (x + 3)^2$$

$$(2) x^2 - 10x + 25 = (x - 5)^2$$

$$(3) x^2 + 12x + 36 = (x + 6)^2$$

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

$$(5) x^2 - 8 = (x + 2\sqrt{2})(x - 2\sqrt{2})$$

$$(6) x^2 - 1 = (x + 1)(x - 1)$$

$$(7) x^2 + 3x + 2 = (x + 1)(x + 2)$$

$$(8) x^2 + 5x + 6 = (x + 2)(x + 3)$$

$$(9) x^2 + 7x + 10 = (x + 2)(x + 5)$$

$$(10) x^2 + 7x + 12 = (x + 3)(x + 4)$$

< 25 ページ.2 次式の因数分解 4 >

問の解答

$$(1) x^2 + 5x - 6 = (x - 1)(x + 6)$$

$$(2) x^2 + x - 6 = (x - 2)(x + 3)$$

$$(3) x^2 + 2x - 15 = (x - 3)(x + 5)$$

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

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

$$(6) x^2 - 2x - 8 = (x - 4)(x + 2)$$

$$(7) x^2 - 6x + 5 = (x - 5)(x - 1)$$

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

$$(9) x^2 - 9x + 8 = (x - 8)(x - 1)$$

$$(10) x^2 - 6x + 8 = (x - 4)(x - 2)$$

< 26 ページ.2 次方程式 1 >

問の解答

$$(1)x^2 - 4 = 0$$

$$\underline{x = \pm 2}$$

$$(2)x^2 - 8 = 0$$

$$\underline{x = \pm 2\sqrt{2}}$$

$$(3)(x - 2)^2 - 5 = 0$$

$$\underline{x = 2 \pm \sqrt{5}}$$

$$(4)3 - (x + 2)^2 = 0$$

$$\underline{x = -2 \pm \sqrt{3}}$$

$$(5)(x - 3)^2 - 9 = 0$$

$$x = 3 \pm 3 \quad \underline{x = 0 \text{ または } 6}$$

$$(6)4 - (x + 1)^2 = 0$$

$$x = -1 \pm 2 \quad \underline{x = -3 \text{ または } 1}$$

< 27 ページ.2 次方程式 2 >

問の解答

$$(1) x^2 + 6x + 8 = 0$$

$$(x + 3)^2 = 1 \quad \underline{x = -4 \text{ または } -2}$$

$$(2) x^2 - 10x + 16 = 0$$

$$(x - 5)^2 = 9 \quad \underline{x = 2 \text{ または } 8}$$

$$(3) x^2 + 8x - 11 = 0$$

$$(x + 4)^2 = 27 \quad \underline{x = -4 \pm 3\sqrt{3}}$$

$$(4) x^2 - 4x + 1 = 0$$

$$(x - 2)^2 = 3 \quad \underline{x = 2 \pm \sqrt{3}}$$

$$(5) x^2 - 3x + 1 = 0$$

$$\left(x - \frac{3}{2}\right)^2 = \frac{5}{4} \quad \underline{x = \frac{3 \pm \sqrt{5}}{2}}$$

$$(6) x^2 + 5x - 2 = 0$$

$$\left(x + \frac{5}{2}\right)^2 = \frac{33}{4} \quad \underline{x = \frac{-5 \pm \sqrt{33}}{2}}$$

< 28 ページ.2 次方程式 3 >

問の解答

$$ax^2 + bx + c = 0$$

$$\Rightarrow x^2 + \frac{b}{a}x = -\frac{c}{a}$$

$$\Rightarrow \left(x + \frac{b}{2a}\right)^2 = \frac{b^2}{4a^2} - \frac{c}{a}$$

$$\Rightarrow \left(x + \frac{b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$$

$$\Rightarrow x + \frac{b}{2a} = \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

$$\Rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\underline{\underline{(答) \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}}}$$

< 29 ページ. 二次方程式と因数分解 1 >

問の解答

$$(1)x^2 - 6x + 8 = 0$$

$$\underline{x = 2 \text{ または } x = 4}$$

$$(2)x^2 - 8x + 7 = 0$$

$$\underline{x = 1 \text{ または } x = 7}$$

$$(3)x^2 - 7x + 10 = 0$$

$$\underline{x = 2 \text{ または } x = 5}$$

$$(4)x^2 + x - 12 = 0$$

$$\underline{x = -4 \text{ または } x = 3}$$

$$(5)x^2 - x - 2 = 0$$

$$\underline{x = -1 \text{ または } x = 2}$$

$$(6)x^2 + 5x + 4 = 0$$

$$\underline{x = -4 \text{ または } x = -1}$$

$$(7)x^2 - 5 = 0$$

$$\underline{x = \pm\sqrt{5}}$$

$$(8)x^2 + x - 1 = 0$$

$$\underline{x = \frac{-1 \pm \sqrt{5}}{2}}$$

< 30 ページ.2 次方程式と因数分解 2 >

問1の解答

$$\begin{aligned} & \left(x - \frac{1 + \sqrt{5}}{2}\right) \left(x - \frac{1 - \sqrt{5}}{2}\right) \\ &= x^2 - \left(\frac{1 + \sqrt{5}}{2} + \frac{1 - \sqrt{5}}{2}\right)x + \frac{1 + \sqrt{5}}{2} \cdot \frac{1 - \sqrt{5}}{2} \\ &= x^2 - x - 1 \end{aligned}$$

問2の解答

$$(1) \quad x^2 - 2x - 3 = (x - 3)(x + 1)$$

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

$$(3) \quad x^2 - 3 = (x - \sqrt{3})(x + \sqrt{3})$$

$$(4) \quad x^2 - x - 4 = \left(x - \frac{1 + \sqrt{17}}{2}\right) \left(x - \frac{1 - \sqrt{17}}{2}\right)$$

$$(5) \quad 2x^2 - 6x - 20 = 2(x - 5)(x + 2)$$

$$(6) \quad 3x^2 + 3x - 18 = 3(x - 2)(x + 3)$$

$$(7) \quad 9x^2 + 6x + 1 = (3x + 1)^2$$

$$(8) \quad 3x^2 - 5x - 2 = (3x + 1)(x - 2)$$

< 31 ページ. 因数定理 >

問の解答

$$(1) \quad x^3 - 3x^2 - x + 3 = (x^2 - 1)(x - 3) = (x - 3)(x - 1)(x + 1)$$

$$(2) \quad x^3 - 6x + 5 = (x - 1)(x^2 + x - 5) = (x - 1) \left(x + \frac{1 + \sqrt{21}}{2} \right) \left(x + \frac{1 - \sqrt{21}}{2} \right)$$

< 32 ページ.3 次方程式 >

問の解答

$$(1) x^3 + 3x^2 - x - 3 = 0$$

$$(x + 3)(x + 1)(x - 1) = 0$$

$$\underline{x = -3 \text{ または } x = -1 \text{ または } x = 1}$$

$$(2) x^3 + 2x^2 - 5x - 6 = 0$$

$$(x + 3)(x + 1)(x - 2) = 0$$

$$\underline{x = -3 \text{ または } x = -1 \text{ または } x = 2}$$

$$(3) x^3 - 3x + 2 = 0$$

$$(x + 2)(x - 1)^2 = 0$$

$$\underline{x = -2 \text{ または } x = 1}$$

$$(4) x^3 + 3x^2 + 3x + 1 = 0$$

$$(x + 1)^3 = 0$$

$$\underline{x = -1}$$

< 33 ページ. 数列 >

問の解答

$$(1) a_n = 3n - 5$$

$$a_1 = -2, a_2 = 1, a_3 = 4, a_4 = 7$$

$$(2) a_n = 3n^2$$

$$a_1 = 3, a_2 = 12, a_3 = 27, a_4 = 48$$

$$(3) a_n = (-1)^n$$

$$a_1 = -1, a_2 = 1, a_3 = -1, a_4 = 1$$

$$(4) a_n = \frac{1}{9} \times 3^n$$

$$a_1 = \frac{1}{3}, a_2 = 1, a_3 = 3, a_4 = 9$$

$$(5) a_n = 8 \times \left(\frac{1}{2}\right)^n$$

$$a_1 = 4, a_2 = 2, a_3 = 1, a_4 = \frac{1}{2}$$

< 34 ページ. 等差数列 >**問 1 の解答**

$$a_n = a + (n - 1)d$$

問 2 の解答

$$a_n = 1 + 2(n - 1) = 2n - 1$$

問 3 の解答

$$a_n = 1 + 7(n - 1) = 7n - 6$$

< 35 ページ. 等比数列 1 >

問1の解答

- (1) 初項 1 公比 3
- (2) 初項 256 公比 $\frac{1}{4}$
- (3) 初項 $\frac{1}{9}$ 公比 -3
- (4) 初項 -1 公比 -1

問2の解答

- (1) 2 , 6 , $\boxed{18}$, 52 , $\boxed{162}$
- (2) 18 , -6 , $\boxed{2}$, $\boxed{-\frac{2}{3}}$, $\frac{2}{9}$

< 36 ページ. 等比数列 2 >

問 1 の解答

$$a_n = ar^{n-1}$$

問 2 の解答

(1) $a_n = 2^{n-1}$

(2) $a_n = 4 \times 3^{n-1}$

(3) $a_n = 81 \times \left(\frac{1}{3}\right)^{n-1}$

(4) $a_n = 8 \times \left(-\frac{1}{2}\right)^{n-1}$

< 37 ページ. 整数指数 >

問の解答

$$(1) 2^0 = 1$$

$$(2) 1^{-1} = 1$$

$$(3) 2^{-2} = \frac{1}{4}$$

$$(4) 3^{-3} = \frac{1}{27}$$

$$(5) 6 \times 4^{-3} = \frac{3}{32}$$

$$(6) 3^6 \times 27^{-2} = 1$$

$$(7) (2^2)^{-1} = \frac{1}{4}$$

$$(8) (3^{-1})^2 = \frac{1}{9}$$

$$(9) (5^{-1})^{-2} = 25$$

< 38 ページ. 累乗根 1 >

問の解答

$$(1) \sqrt{169} = 13$$

$$(2) \sqrt[3]{8} = 2$$

$$(3) \sqrt[3]{125} = 5$$

$$(4) \sqrt[4]{256} = 4$$

$$(5) \sqrt[4]{\frac{81}{625}} = \frac{3}{5}$$

$$(6) \sqrt[5]{3125} = 5$$

< 39 ページ. 累乗根 2 >

問の解答

$$(1) \sqrt[3]{3} \times \sqrt[3]{5} = \sqrt[3]{15}$$

$$(2) \sqrt[4]{2} \times \sqrt[4]{4} = \sqrt[4]{8}$$

$$(3) \frac{\sqrt[3]{3}}{\sqrt[3]{15}} = \frac{1}{\sqrt[3]{5}}$$

$$(4) \frac{\sqrt[5]{128}}{\sqrt[5]{4}} = \sqrt[5]{32} = 2$$

< 40 ページ. 累乗根 3 >**問 1 の解答**

(1) $\sqrt[3]{54} = 3\sqrt[3]{2}$

(2) $\sqrt[4]{112} = 2\sqrt[4]{7}$

(3) $\sqrt[5]{64} = 2\sqrt[5]{2}$

問 2 の解答

(1) $\left(\sqrt[4]{4}\right)^2 = 2$

(2) $\left(\sqrt[9]{27}\right)^3 = 3$

(3) $\sqrt[4]{16^2} = 4$

(4) $\sqrt[6]{25^3} = 5$