高知工科大学

基礎数学ワークブック

(2004年度版)

入門編

No. 1

解答

＜ 2ページ. わり算・かけ算 ＞

問 1 の解答

(1)$1372 \div 28 = 49$

$$\begin{array}{r} \,49 \\ 28\overline{)1372} \\ \underline{112} \\ 252 \\ \underline{252} \\ 0 \end{array}$$

(2)$5382 \div 46 = 117$

$$\begin{array}{r} \,117 \\ 46\overline{)5382} \\ \underline{46} \\ 78 \\ \underline{46} \\ 322 \\ \underline{322} \\ 0 \end{array}$$

(3)$2377 \div 98 = 24 \cdots 25$

$$\begin{array}{r} \,24 \\ 98\overline{)2377} \\ \underline{196} \\ 417 \\ \underline{392} \\ 25 \end{array}$$

(4)$7448 \div 67 = 111 \cdots 11$

$$\begin{array}{r} \,111 \\ 67\overline{)7448} \\ \underline{67} \\ 74 \\ \underline{67} \\ 78 \\ \underline{67} \\ 11 \end{array}$$

(5)$16.2 + 25.8 = 42.0$

$$\begin{array}{r} \,16.2 \\ +\,25.8 \\ \hline \,42.0 \end{array}$$

(6)$135 + 7.5 = 142.5$

$$\begin{array}{r} \,135 \\ +7.5 \\ \hline \,142.5 \end{array}$$

問 2 の解答

(1) $28 \times 1.4 = 39.2$

(2) $34.5 \times 0.7 = 24.15$

(3) $29.9 \div 2.3 = 13$

(4) $1120.5 \div 2.7 = 415$

< 3ページ. 分数 (1) >

問 1 の解答

(1) $\dfrac{2}{7}+\dfrac{5}{21}=\dfrac{6+5}{21}=\dfrac{11}{21}$

(2) $\dfrac{11}{34}+\dfrac{13}{17}=\dfrac{11+26}{34}=\dfrac{37}{34}$

(3) $\dfrac{27}{21}+\dfrac{5}{27}=\dfrac{243+35}{189}=\dfrac{278}{189}$

(4) $\dfrac{3}{15}+\dfrac{7}{12}=\dfrac{12+35}{60}=\dfrac{47}{60}$

(5) $\dfrac{1}{2}+\dfrac{2}{3}+\dfrac{5}{6}=\dfrac{3+4+5}{6}=\dfrac{12}{6}=2$

問 2 の解答

(1) $\dfrac{13}{14}-\dfrac{5}{7}=\dfrac{13-10}{14}=\dfrac{3}{14}$

(2) $\dfrac{2}{3}-\dfrac{3}{11}=\dfrac{22-9}{33}=\dfrac{13}{33}$

(3) $\dfrac{3}{4}-\dfrac{19}{28}=\dfrac{21-19}{28}=\dfrac{2}{28}=\dfrac{1}{14}$

(4) $\dfrac{11}{81}-\dfrac{13}{54}=\dfrac{22-39}{162}=\dfrac{-17}{162}=-\dfrac{17}{162}$

(5) $5-\dfrac{6}{7}-\dfrac{1}{3}=\dfrac{35-6}{7}-\dfrac{1}{3}=\dfrac{29}{7}-\dfrac{1}{3}=\dfrac{87-7}{21}=\dfrac{80}{21}$

問 3 の解答

(1) $\dfrac{1}{7}\times\dfrac{7}{3}=\dfrac{1}{3}$

(2) $\dfrac{9}{7}\times\dfrac{5}{9}=\dfrac{5}{7}$

(3) $\dfrac{3}{2}\times\dfrac{1}{3}\times\dfrac{9}{4}=\dfrac{9}{8}$

(4) $3\times\dfrac{1}{2}\times\dfrac{7}{18}=\dfrac{7}{12}$

(5) $\dfrac{7}{4}\times\dfrac{3}{7}\times\dfrac{2}{9}=\dfrac{1}{6}$

< 4ページ. 分数 (2) >

問 1 の解答

(1) $\dfrac{1}{3} \div \dfrac{1}{5} = \dfrac{1}{3} \times \dfrac{5}{1} = \dfrac{5}{3}$

(2) $\dfrac{3}{7} \div \dfrac{3}{4} = \dfrac{3}{7} \times \dfrac{4}{3} = \dfrac{4}{7}$

(3) $18 \div \dfrac{3}{5} = 18 \times \dfrac{5}{3} = 30$

(4) $\dfrac{3}{7} \div \dfrac{12}{13} = \dfrac{3}{7} \times \dfrac{13}{12} = \dfrac{13}{28}$

(5) $\dfrac{3}{7} \div 3 \div \dfrac{1}{7} = \dfrac{3}{7} \times \dfrac{1}{3} \times \dfrac{7}{1} = 1$

問 2 の解答

(1) $\dfrac{1}{3} + \dfrac{1}{4} - \dfrac{1}{12} = \dfrac{4+3-1}{12} = \dfrac{6}{12} = \dfrac{1}{2}$

(2) $3 - \dfrac{1}{5} + \dfrac{5}{6} = \dfrac{90-6+25}{30} = \dfrac{109}{30}$

(3) $\dfrac{4}{3} \div \dfrac{7}{6} \times \dfrac{7}{2} = \dfrac{4}{3} \times \dfrac{6}{7} \times \dfrac{7}{2} = 4$

(4) $\dfrac{1}{3} \times \dfrac{3}{4} + \dfrac{4}{5} \div \dfrac{5}{6} = \dfrac{1}{4} + \dfrac{24}{25} = \dfrac{25+96}{100} = \dfrac{121}{100}$

(5) $\dfrac{7}{3} \div 5 - \dfrac{1}{2} \times \dfrac{8}{3} = \dfrac{7}{15} - \dfrac{4}{3} = \dfrac{7-20}{15} = -\dfrac{13}{15}$

問 3 の解答

(1) $69 - 56 \div 8 + 13 = 69 - 7 + 13 = 75$

(2) $1.7 - \dfrac{1}{8} + 0.4 - \dfrac{3}{5} = 2.1 - \dfrac{5+24}{40} = \dfrac{84}{40} - \dfrac{29}{40} = \dfrac{55}{40} = \dfrac{11}{8}$

(3) $\dfrac{3}{8} \times \dfrac{4}{9} + 18 \div 0.6 = \dfrac{1}{6} + 30 = \dfrac{181}{6}$

(4) $0.9 + \left(\dfrac{3}{4} + 0.05\right) \times \dfrac{1}{5} = 0.9 + 0.8 \times 0.2 = 1.06$

(5) $1.1 \div \left(\dfrac{3}{4} - 0.2\right) - \dfrac{2}{3} = 2 - \dfrac{2}{3} = \dfrac{4}{3}$

＜5ページ. 正の数・負の数＞

問 1 の解答

(1) $(-7)+(-9)=-16$

(2) $(+3.9)+(-4.7)=-0.8$

(3) $\left(+\frac{2}{3}\right)+\left(-\frac{8}{9}\right)=\frac{6-8}{9}=-\frac{2}{9}$

(4) $(+18)+(-113)=-95$

(5) $0+(-\frac{5}{7})=-\frac{5}{7}$

問 2 の解答

(1) $(+5)-(+7)=-2$

(2) $(+15)-(-9)=24$

(3) $(+39)-(-23)=62$

(4) $(-7)-(+9)=-16$

(5) $(-7.3)-(-1.7)=-5.6$

問 3 の解答

(1) $3-5-7=-9$

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

(3) $-7-9+3-5=-18$

(4) $8-5-7+3=11-12=-1$

(5) $-13-19+7-5+6=-37+13=-24$

(6) $-4.7+(-0.3)+(-0.5)=-5.5$

(7) $-3+\frac{3}{4}+\frac{5}{12}-\left(-\frac{1}{12}\right)=\frac{-21}{12}=-\frac{7}{4}$

< 6ページ. 混合算 >

問 1 の解答

(1) $(-9) \div (-3) = 3$

(2) $(-21) \times 4 = -84$

(3) $(-6.3) \div 0.7 = -9$

(4) $\dfrac{6}{7} \div (-18) = -\dfrac{1}{21}$

(5) $(-36) \times 6 \div 2 = -108$

(6) $0 \div (-1080) = 0$

問 2 の解答

(1) $-(-7)^2 = -49$

(2) $-(-9^2) = 81$

(3) $(-27) \div (-3^2) = 3$

(4) $5^2 \times \left(-\dfrac{1}{5}\right)^2 = 1$

問 3 の解答

(2), (5), (6), (9), (10)

問 4 の解答

(1) $13 + (-7) \times (-6) = 13 + 42 = 55$

(2) $(-18) \div (-5 + 4) = 18$

(3) $10 - 8 \div (-2) = 10 - (-4) = 14$

(4) $(-14) \div (8 - 10) = (-14) \div (-2) = 7$

(5) $(-3.9) \times 0 + (-8) \div 0.2 + (-2) = 0 - 40 - 2 = -42$

(6) $\left(-\dfrac{3}{4}\right)^2 \div \dfrac{27}{8} - \left(-\dfrac{1}{2}\right)^3 = \dfrac{4+3}{24} = \dfrac{7}{24}$

(7) $\left(-\dfrac{5}{8}\right) \div \left(-\dfrac{20}{3}\right) \times \left(-\dfrac{4}{3}\right) + 10 = -\dfrac{1}{8} + \dfrac{80}{8} = \dfrac{79}{8}$

< 7ページ. 式の計算 >

問 1 の解答

(1) $19 + 7 \div \{3 - (-4)\} = 19 + 7 \div 7 = 20$

(2) $13 + 3 \times \{-7 - (-4)\} = 13 + 3 \times (-3) = 4$

(3) $\{9 - (-7)\} \div 2 - 3 = 8 - 3 = 5$

(4) $54 \div \{(2-5)^2 \div 3\} - 6 = 54 \div 3 - 6 = 12$

(5) $3^2 + \{9 - (2-7) \div 5\} = 9 + (9+1) = 19$

問 2 の解答

(1) $(-1) \div a = -\dfrac{1}{a}$

(2) $3x \div 4 = \dfrac{3}{4}x$

(3) $7 \div (x+3) = \dfrac{7}{x+3}$

(4) $5x \div (-3) = -\dfrac{5}{3}x$

(5) $9a \div 3a = 3$

問 3 の解答

(1) $5a \times b \times 7 + 3 \times 8b \times 6 = 35ab + 144b$

(2) $x \times 5 \times 3y - 18 \div 8 \times x = 15xy - \dfrac{9}{4}x$

(3) $7a - 11a + 7a = 3a$

(4) $-\dfrac{3}{8}x - \dfrac{3}{4}x = -\dfrac{9}{8}x$

(5) $x - 0.1x + 0.01x = (1.01 - 0.1)x = 0.91x$

(6) $\dfrac{7}{8}a - \dfrac{3}{4}a - \dfrac{1}{2}a = \dfrac{7-6-4}{8}a = -\dfrac{3}{8}a$

(7) $-0.3x + 3 + (-1.5x) - 5 + 0.9x = -1.8x - 2 + 0.9x = -0.9x - 2$

< 8ページ.1 次方程式 (1) >

問 1 の解答

(1) $-4ab = -4 \times 7 \times (-3) = 84$

(2) ① $100x + 7 \times 10 + y = 100x + 70 + y$

② 379

問 2 の解答

(1) ① $x = -3$

② $x = -71$

③ $x = -\dfrac{19}{4}$

④ $x = -3$

⑤ $x = \dfrac{13}{7}$

(2) ① $x = \dfrac{21}{5}$

② $x = \dfrac{9}{20}$

③ $x = -\dfrac{17}{11}$

④ $x = \dfrac{17}{7}$

(3) ① $x = \dfrac{1}{2}$

② $x = -\dfrac{13}{8}$

③ $x = -15$

④ $x = \dfrac{169}{101}$

< 9ページ.1 次方程式 (2) >

問の解答

(1) ① $x = \dfrac{13}{5}$

② $x = 23$

③ $x = \dfrac{11}{2}$

(2) ① $x = -1$

② $x = 0$

③ $x = 0$

④ $x = 0$

⑤ $x = 0$

⑥ $x = -\dfrac{1}{2}$

(3) ① $x = 21$

② $x = \dfrac{25}{16}$

③ $x = \dfrac{20}{9}$

④ $x = \dfrac{63}{5}$

⑤ $x = -1$

⑥ $x = -\dfrac{1}{16}$

< 10 ページ.1 次方程式 (3) >

問の解答

(1) ① $x = -\dfrac{21}{26}$

② $x = \dfrac{73}{17}$

③ $x = \dfrac{43}{32}$

(2) ① $x = -18$

② $x = -\dfrac{45}{49}$

③ $x = \dfrac{145}{47}$

(3) ① $x = 7$

② $x = \dfrac{5}{13}$

③ $x = -13$

④ $x = \dfrac{24}{13}$

⑤ $x = -\dfrac{29}{26}$

< 11 ページ. 単項式・多項式 >

問 1 の解答

(1) $2a^2 \times 3a^5 = 6a^7$

(2) $(-2x)^3 = -8x^3$

(3) $2x \times (x^2)^3 = 2x^7$

(4) $(-3x^3)^2 \times 7x = 9x^6 \times 7x = 63x^7$

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

(6) $(4a^2b) \div (6ab^2) = \dfrac{2a}{3b}$

(7) $(42xy)^2 \times 3x^2y = 5292x^4y^3$

(8) $(-a^2b)^3 \times (ab^2)^2 = -a^8b^7$

問 2 の解答

(1) $(x^2 - x + 6) + (x^2 + 4x - 5) = 2x^2 + 3x + 1$

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

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

(4) $(5x^2 + 3x + 2) + (x^2 - x + 3) - (x + 1) = 6x^2 + x + 4$

(5) $-3(2x^2 - 5x - 2) = -6x^2 + 15x + 6$

(6) $(x^2 - 7x + 5) - 3(x^2 + 2x - 4) = -2x^2 - 13x + 17$

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

(8) $(4x^2 - 2x - 5) - (-3x^2 + 2x + 4) = 7x^2 - 4x - 9$

< 12 ページ. 展開・因数分解 >

問 1 の解答

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

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

(3) $(x+3)(x+7) = x^2 + 10x + 21$

(4) $(3x+2y)^2 = 9x^2 + 12xy + 4y^2$

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

(6) $(3x+4)(3x-4) = 9x^2 - 16$

(7) $(x+4)(x+6) = x^2 + 10x + 24$

(8) $(x-2)(x-6) = x^2 - 8x + 12$

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

(10) $(x+3)^3 = x^3 + 9x^2 + 27x + 27$

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

(12) $(x+y+2)(x+y-2) = x^2 + 2xy + y^2 - 4$

問 2 の解答

(1) $3x^2 - 12x = 3x(x-4)$

(2) $2x^2y - 10xy^2 + 6xyz = 2xy(x - 5y + 3z)$

(3) $x^2 - 10x + 24 = (x-4)(x-6)$

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

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

(6) $16x^2 - 1 = (4x+1)(4x-1)$

(7) $x^2 - 12x + 35 = (x-5)(x-7)$

(8) $x^2 + 7x - 18 = (x-2)(x+9)$

(9) $x^3 + 125 = (x+5)(x^2 - 5x + 25)$

(10) $(x^3 - y^3) - (x^2 - y^2) = (x-y)(x^2 + xy + y^2 - x - y)$

(11) $x^6 - y^3 = (x^2 - y)(x^4 + x^2y + y^2)$

(12) $8x^3 - 27y^3 = (2x - 3y)(4x^2 + 6xy + 9y^2)$

< 13ページ. 分数式 >

問 1 の解答

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

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

(3) $a^3+b^3=(a+b)^3-3ab(a+b)=X^3-3XY$

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

問 2 の解答

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

(2) $\dfrac{x-y}{\frac{1}{x}-\frac{1}{y}}=\dfrac{xy(x-y)}{y-x}=-xy$

(3) $\dfrac{\frac{z}{2}+\frac{w}{5}}{\frac{x}{4}-\frac{y}{6}}=\dfrac{30z+12w}{15x-10y}$

(4) $\dfrac{\frac{y}{x}}{\frac{w}{z}}=\dfrac{y}{x}\times\dfrac{z}{w}=\dfrac{yz}{xw}$

(5) $\dfrac{\frac{y}{x}-\frac{w}{z}}{\frac{y}{x}+\frac{w}{z}}=\dfrac{yz-xw}{yz+xw}$

(6) $\dfrac{1}{\frac{1}{a}+\frac{1}{b}-\frac{1}{c}}=\dfrac{1}{\frac{bc+ac-ab}{abc}}=\dfrac{abc}{bc+ac-ab}$

(7) $\dfrac{1}{x}-\dfrac{1}{x+1}=\dfrac{1}{x(x+1)}$

(8) $\dfrac{1}{a+2}-\dfrac{1}{a+3}=\dfrac{1}{(a+2)(a+3)}$

(9) $\dfrac{3}{a(3-a)}+\dfrac{a}{3(a-3)}=\dfrac{3+a}{3a}$

(10) $\dfrac{x+1}{x}-\dfrac{x+2}{x+1}=\dfrac{1}{x(x+1)}$

(11) $\dfrac{1}{(y-1)y}+\dfrac{1}{y(y+1)}=\dfrac{(y+1)+(y-1)}{y(y+1)(y-1)}=\dfrac{2y}{y(y+1)(y-1)}=\dfrac{2}{(y+1)(y-1)}$

(12) $\dfrac{a+2}{a}-\dfrac{a+3}{a+1}+\dfrac{a}{a-1}=\dfrac{a^3+a^2+2a-2}{a(a+1)(a-1)}$

< 14ページ. 平方根 (1) >

問の解答

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

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

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

(4) $5(\sqrt{5}+\sqrt{2})-3(2\sqrt{5}-\sqrt{2})=-\sqrt{5}+8\sqrt{2}$

(5) $\sqrt{27}=3\sqrt{3}$

(6) $\sqrt{0.0049}=\sqrt{49\times10^{-4}}=7\times10^{-2}=0.07$

(7) $\sqrt{\dfrac{75}{16}}=\dfrac{5\sqrt{3}}{4}$

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

(9) $\sqrt{12}\sqrt{18}=2\sqrt{3}\times3\sqrt{2}=6\sqrt{6}$

(10) $\sqrt{5}\sqrt{45}=\sqrt{5}\times3\sqrt{5}=15$

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

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

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

(14) $\sqrt{(-27)(-3)}=9$

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

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

(17) $\sqrt{8}\times\sqrt{18}=12$

(18) $\sqrt{21}\times\sqrt{84}=\sqrt{21}\times2\sqrt{21}=42$

(19) $\dfrac{\sqrt{54}}{\sqrt{3}}=\sqrt{18}=3\sqrt{2}$

(20) $\dfrac{\sqrt{405}}{\sqrt{15}}=\sqrt{27}=3\sqrt{3}$

(21) $\dfrac{\sqrt{3}\times\sqrt{18}}{\sqrt{2}}=\sqrt{3}\times\sqrt{9}=3\sqrt{3}$

(22) $\dfrac{\sqrt{20}}{\sqrt{3}\times\sqrt{15}}=\dfrac{2}{3}$

(23) $4\sqrt{3}+\sqrt{75}=9\sqrt{3}$

(24) $2\sqrt{7}-\sqrt{63}=-\sqrt{7}$

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

(26) $\sqrt{5}(3\sqrt{10}-2\sqrt{5})=15\sqrt{2}-10$

(27) $\sqrt{8}(\sqrt{6}-\sqrt{24})=-4\sqrt{3}$

(28) $\dfrac{\sqrt{8}-\sqrt{6}}{\sqrt{2}}=2-\sqrt{3}$

< 15ページ. 平方根 (2) >

問 1 の解答

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

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

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

(4) $(3\sqrt{2}+2)^2 = 22+12\sqrt{2}$

(5) $(2\sqrt{3}-3)^2 = 21-12\sqrt{3}$

(6) $(2\sqrt{3}-3\sqrt{2})^2 = 30-12\sqrt{6}$

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

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

(9) $(3+\sqrt{3})(3-\sqrt{3}) = 6$

(10) $(3\sqrt{3}-\sqrt{2})(3\sqrt{3}+\sqrt{2}) = 25$

問 2 の解答

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

(2) $\dfrac{4}{3\sqrt{12}} = \dfrac{2\sqrt{3}}{9}$

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

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

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

(6) $\dfrac{2+\sqrt{3}}{2-\sqrt{3}} = 7+4\sqrt{3}$

(7) $\dfrac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}} = \dfrac{8-2\sqrt{15}}{2}$

(8) $\dfrac{2-\sqrt{3}}{\sqrt{3}+2} = 7-4\sqrt{3}$

問 3 の解答

(1) $a+b = 14$

(2) $a-b = -8\sqrt{3}$

(3) $ab = 1$

(4) $a^2+b^2 = 194$

問 4 の解答

(1) $\dfrac{\sqrt{5}-2}{\sqrt{5}+2} + \dfrac{\sqrt{5}+2}{\sqrt{5}-2} = 18$

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

< 16ページ. 等式の変形 >

問の解答

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

(2) $P = \dfrac{2\pi R}{V}$

(3) $T_1 = T_2 - \dfrac{LH}{KA}$

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

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

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

(7) $\psi = \dfrac{\lambda\omega}{\lambda+\omega}$

(8) $R = \dfrac{\alpha\beta\gamma}{\alpha\beta+\beta\gamma+\gamma\alpha}$

(9) $v = \dfrac{m_1+m_2}{m_1}\sqrt{2gh}$

(10) $x = x_0 + \dfrac{v^2 - v_0^2}{2a}$

< 17ページ.数としての文字 >

問 1 の解答

$y = 5,\ \ z = 10,\ \ w = 2$

問 2 の解答

$$(1)\begin{cases} x = 5 \\ y = 6 \\ z = 1 \\ w = 2 \end{cases}$$

$$(2)\begin{cases} x = 7 \\ y = 6 \\ z = 8 \\ w = 1 \end{cases}$$

問 3 の解答

$$(1)\begin{cases} x = 12 \\ y = 9 \\ z = 4 \end{cases}$$

< 18ページ. 連立一次方程式 >

問の解答

(1) $x = 2 \quad , \quad y = 3$ (2) $x = 4 \quad , \quad y = -2$

(3) $x = \dfrac{23}{17} \quad , \quad y = -\dfrac{13}{17}$ (4) $x = 6 \quad , \quad y = \dfrac{1}{4}$

< 19ページ. 連立一次方程式の応用 (1) >

問 1 の解答

(答) A4 ノート 7 冊
　　B5 ノート 13 冊

問 2 の解答

(答) 大人 60 人
　　子供 40 人

問 3 の解答

昨年度男生徒　: x 人

昨年度女生徒　: y 人

$x + y = 600$

$1.03x + 0.97y = 606$

(答) 昨年度男生徒 400 人
　　昨年度女生徒 200 人
　　本年度男生徒 412 人
　　本年度女生徒 194 人

< 20 ページ. 連立一次方程式の応用 (2) >

問 1 の解答

(答) リンゴ 30 個
　　みかん 50 個

問 2 の解答

(答) 鉛筆 1 本 60 円
　　ノート 1 冊 130 円

問 3 の解答

(答)　1100 円

< 21 ページ. たすき掛け >

問の解答

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

< 22 ページ. 方程式 >

問 1 の解答

(1) $x = 6$

(2) $x = 3$

(3) $x = -2$

(4) $x = -6$

問 2 の解答

(1) $x = 0,\ -1$

(2) $x = 3,\ -5$

(3) $x = 4$

(4) $x = \pm\sqrt{18} = \pm 3\sqrt{2}$

(5) $x = 8,\ -2$

(6) $x = -1 \pm 2\sqrt{2}$

(7) $x = \dfrac{-1 \pm \sqrt{13}}{2}$

(8) $x = \dfrac{-7 \pm \sqrt{17}}{2}$

(9) $x = \dfrac{5 \pm \sqrt{33}}{4}$

(10) $x = \dfrac{3 \pm \sqrt{5}}{4}$

(11) $x = \dfrac{-2}{5},\ x = 3$

(12) $x = 6 \pm 4\sqrt{2}$

(13) $x = -1,\ x = 9$

(14) $x = \dfrac{-1 \pm \sqrt{5}}{2}$

(15) $x = \dfrac{1}{2}$

(16) $x = \dfrac{1 \pm \sqrt{7}}{2}$

(17) $x = \dfrac{1}{2},\ -\dfrac{5}{2}$

(18) $x = \dfrac{1 \pm \sqrt{5}}{2}$

(19) $x = 0,\ 5$

(20) $x = 0,\ -\dfrac{7}{2}$

< 23 ページ.2 次方程式の応用 (1) >

問 1 の解答

2 数を a，b とすると　　$(a \leqq b)$

$$a - b = 4$$

$$ab = 96$$

これを解いて

$a = 12$，$b = 8$　　8，12

問 2 の解答

$$\frac{n(n-3)}{2} = 20$$

$$n(n-3) = 40$$

$$n^2 - 3n - 40 = 0$$

$$(n+5)(n-8) = 0$$

$n = 8$　　8 角形

問 3 の解答

(1) ① FE=1

② BF=$x - 1$

③ EH=$x - 1$

④ FH=$2 - x$

⑤ FG=$2 - x$

(2) $x = \dfrac{1+\sqrt{5}}{2}$

< 24 ページ.2 次方程式の応用 (2) >

問 1 の解答

8cm と 12cm

問 2 の解答

道幅を xm とすると

$(20-x)(27-x)=450$

$x=45,\ 2$

$0<x<20$ より　　$x=2$

問 3 の解答

4 秒後

問 4 の解答

(1) 180(m)

(2) 5 秒後, 7 秒後

(3) 12 秒後

< 25 ページ. 比例・反比例 (1) >

問 1 の解答

6.25 倍

問 2 の解答

405(g)

問 3 の解答

(1) $y = \dfrac{50}{x^2}$

(2) $y = \dfrac{50}{5^2} = 2$　　2 ルクス

< 26 ページ. 比例・反比例 (2) >

問 1 の解答

(1) $z = \dfrac{kx}{y^2}$ とおく。 $x = 1,\ y = 1$ のとき $z = 1$ より $k = 1$ $\underline{(答) z = \dfrac{x}{y^2}}$

(2) $z = \dfrac{50}{2^2} = 12.5$ $\underline{(答) 12.5 \text{ ルクス}}$

問 2 の解答

(1) $V = \dfrac{kT}{P}$ $35 = \dfrac{k \times 280}{2} \Rightarrow k = \dfrac{1}{4}$

$\underline{(答) V = \dfrac{T}{4P}}$

(2) $V = \dfrac{300}{4 \times 5} = 15$

$\underline{(答) V = 15(\ell)}$

問 3 の解答

(1) 切り口の面積を S とすると $S = \pi y^2$。 よって z と x, y の関係は

$$z = \frac{kx}{S} = \frac{kx}{\pi y^2}$$

である。

$x = 1,\ y = 2$ のとき $z = 0.0014$ より $k = 0.0056\pi$

$\underline{(答) z = \dfrac{0.0056x}{y^2}}$

(2) $x = 6, y = 1$ のとき $z = \dfrac{0.0056x}{y^2} = 0.0056 \times 6 = 0.0336$

$\underline{(答) 0.0336 \text{ オーム}}$

< 27ページ.時計の問題 >

問 1 の解答

時間 (分) x	0	1	10	20	30	45	60	x
長針の回転角度 y	0°	6°	60°	120°	180°	270°	360°	$6x$

$y = 6x$

問 2 の解答

時間 (分) x	0	1	10	20	30	45	60	x
短針の回転角度 z	0°	0.5°	5°	10°	15°	22.5°	30°	$\frac{x}{2}$

$z = \frac{x}{2}$

問 3 の解答

$y - z = 90°$ または $y - z = 270°$ のどちらかである。

(1) $y - z = 90°$ のとき　　$6x - \frac{x}{2} = 90$　　$12x - x = 180 \Rightarrow 11x = 180$

$$x = \frac{180}{11} = 16 + \frac{4}{11} \text{ (分)}$$

$$\frac{4}{11} \text{ (分)} = \frac{240}{11} \text{(秒)} \fallingdotseq 21.8 \text{(秒)}$$

(2) $y - z = 270°$ のとき　　$6x - \frac{x}{2} = 270 \Rightarrow 11x = 540$

$$x = \frac{540}{11} = 49 + \frac{1}{11} \text{ (分)}$$

$$\frac{1}{11} \text{ (分)} = \frac{60}{11} \text{(秒)} \fallingdotseq 5.5 \text{(秒)}$$

(答)　12 時 $16\frac{4}{11}$ 分 (16 分 21.8 秒) か または

12 時 $49\frac{1}{11}$ 分 (49 分 5.5 秒)

< 28 ページ. ベルトの問題 >

問 1 の解答

中心角 y°	0°	1°	30°	45°	90°	180°	360°	y°
弧の長さ ℓ	0	$\frac{\pi}{180}$	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{2}$	π	2π	$\frac{\pi}{180}y$

$$\ell = \frac{\pi}{180}y$$

問 2 の解答

中心角 x°	0°	1°	10°	15°	30°	60°	120°	180°	360°	x°
弧の長さ ℓ	0	$\frac{\pi}{60}$	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{2}$	π	2π	3π	6π	$\frac{\pi}{60}x$

$$\ell = \frac{\pi}{60}x$$

問 3 の解答

$\ell = \frac{\pi}{60}x = \frac{\pi}{180}y \quad \Rightarrow \quad \underline{(\text{答})\ \ y = 3x}$

問 4 の解答

$\frac{2}{1} \times \frac{2.7}{0.9} = 2 \times 3 = 6$

$\underline{(\text{答})\ \ y = 6x}$

< 29 ページ. 関数 >

問 1 の解答

時間 (秒) x	1	10	60	600	3600	x
距離 (m) y	10	100	600	6000	36000	$10x$

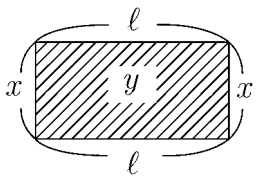
$y = 10x$

問 2 の解答

$2x + 2\ell = 8 \quad \Rightarrow \quad \ell = 4 - x$

$y = x\ell = x(4 - x)$

(答) $y = 4x - x^2$



問 3 の解答

中心角 $x°$	1°	10°	30°	45°	90°	180°	360°	$x°$
面 積 $y\,\mathrm{cm}^2$	$\frac{\pi r^2}{360}$	$\frac{\pi r^2}{36}$	$\frac{\pi r^2}{12}$	$\frac{\pi r^2}{8}$	$\frac{\pi r^2}{4}$	$\frac{\pi r^2}{2}$	πr^2	$\frac{\pi r^2}{360}x$

(答) $y = \frac{\pi r^2}{360}x$

問 4 の解答

500g 増えると 1cm のびる → 1kg 増えると 2cm のびる

100g 増えると 0.2cm のびる ⇒ 重り 0 のとき 15cm

(答) $y = 15 + 2x$

< 30ページ. 単位の計算 (1) >

問 1 の解答

(1) 0.123　　(2) 7.5　　(3) 10000000 $(= 10^7)$

問 2 の解答

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

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

問 3 の解答

(1) 36　　(2) 0.01　　(3) 3600

(4) 2.6　　(5) 138　　(6) 0.25 $\left(= \frac{1}{4}\right)$

< 31 ページ. 単位の計算 (2) >

問 1 の解答

(1) 10000 $(= 10^4)$　(2) 1000000 $(= 10^6)$　(3) 50　(4) 0.0006

問 2 の解答

(1) 1000 $(= 10^3)$　(2) 1000000 $(= 10^6)$　(3) 1000000000 $(= 10^9)$　(4) 1000000 $(= 10^6)$

< 32 ページ. 単位の計算 (3) >

問 1 の解答

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

問 2 の解答

$$\frac{5\text{m}}{6\text{s}} = \frac{50\text{m}}{60\text{s}} = \frac{50\text{m}}{1\text{min}} = \frac{50 \times 60\text{m}}{60\text{min}} = \frac{3000\text{m}}{1\text{h}} = 3000\text{m/h} = 3\text{km/h}$$

問 3 の解答

$$\frac{54\text{km}}{(60+39)\text{min}} = \frac{54000\text{m}}{99 \times 60\text{s}} = \frac{900\text{m}}{99\text{s}} = \frac{100\text{m}}{11\text{s}}$$

(答) 100m を 11 秒で走る

< 33 ページ.1 次関数のグラフ (1) >

問の解答

(1)

x	-1	0	1	2	3
y	-7	-4	-1	2	5

(2)

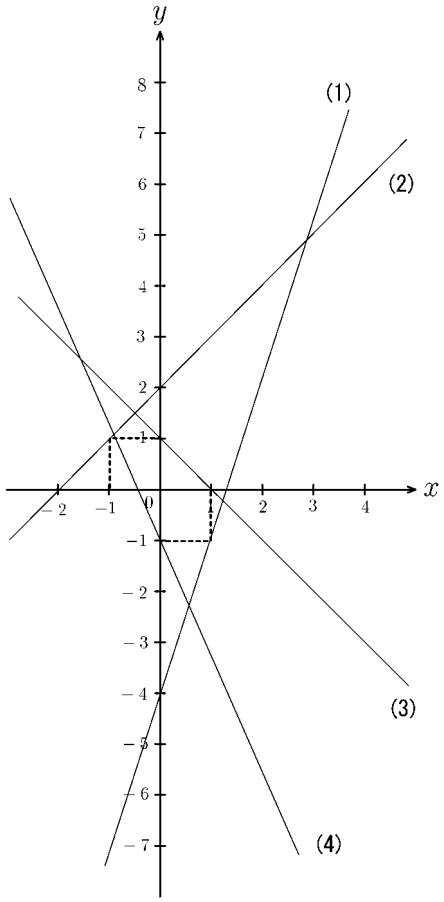
x	-2	-1	0	1	2	3
y	0	1	2	3	4	5

(3)

x	-2	-1	0	1	2	3
y	3	2	1	0	-1	-2

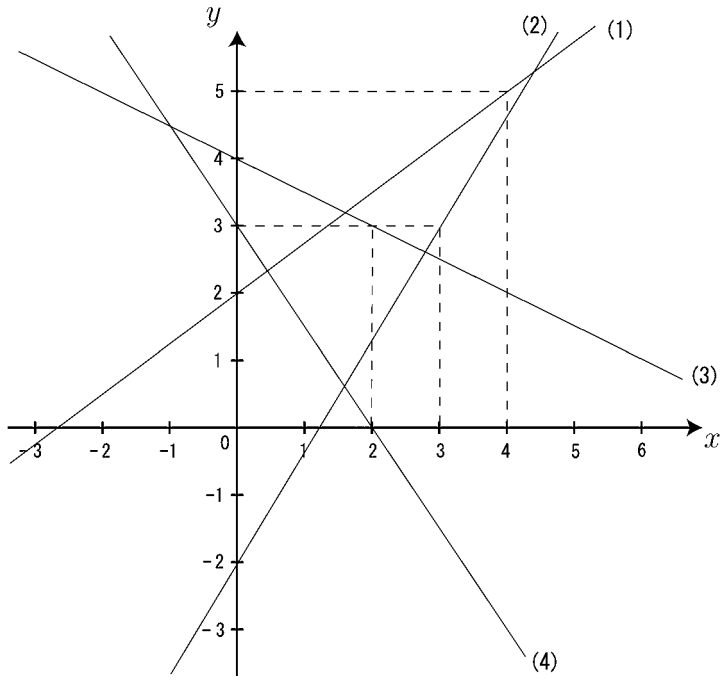
(4)

x	-2	-1	0	1	2	3
y	3	1	-1	-3	-5	-7



< 34 ページ.1 次関数のグラフ (2) >

問 1 の解答



問 2 の解答

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

(4) $y = -x + 4$　　(5) $y = -2x + 1$

< 35 ページ.1 次関数のグラフ (3) >

問の解答

(1) $y-3=4(x-0)$, $y=4x+3$

(2) $y-0=5(x-3)$, $y=5x-15$

(3) $y-3=4(x-2)$, $y=4x-5$

(4) $y-2=-1\times(x+1)$, $y=-x+1$

(5) $y-3=0(x+2)$, $y=3$

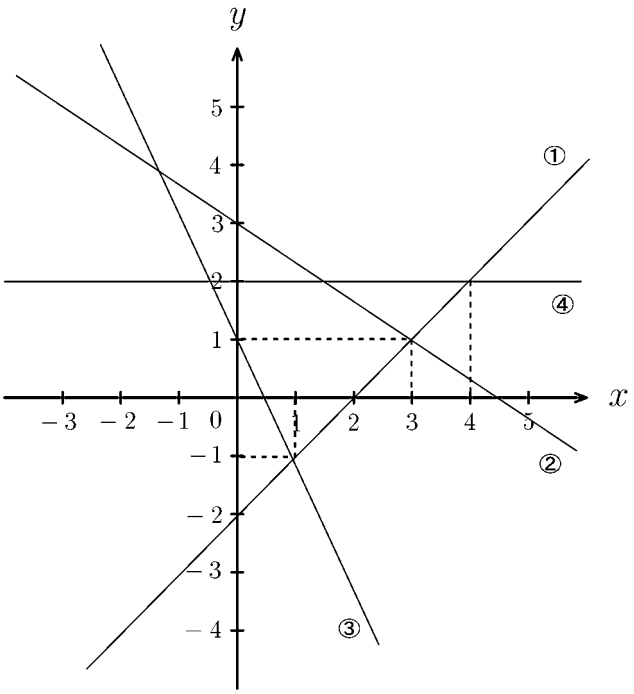
(6) 傾き $m=\dfrac{2-1}{3-0}=\dfrac{1}{3}$, $y-1=\dfrac{1}{3}(x-0)$, $y=\dfrac{1}{3}x+1$

(7) 傾き $m=\dfrac{2-0}{2-1}=2$, $y-0=2(x-1)$, $y=2x-2$

(8) 傾き $m=\dfrac{0-4}{3-0}=\dfrac{4}{3}$, $y-4=\dfrac{4}{3}(x-0)$, $y=-\dfrac{4}{3}x+4$

< 36 ページ.1 次関数のグラフ (4) >

問 1 の解答



問 2 の解答

(1) $(3,\ 1)$

(2) $(1,\ -1)$

(3) $(4,\ 2)$

(4) $\left(-\dfrac{3}{2},\ 4\right)$

(5) $\left(\dfrac{3}{2},\ 2\right)$

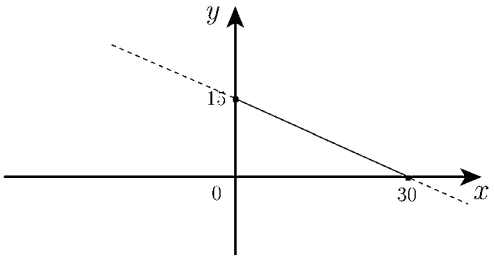
(6) $\left(-\dfrac{1}{2},\ 2\right)$

< 37ページ.1 次関数のグラフ (5) >

問 1 の解答

x 分後には，$0.5x$ 短くなるから，

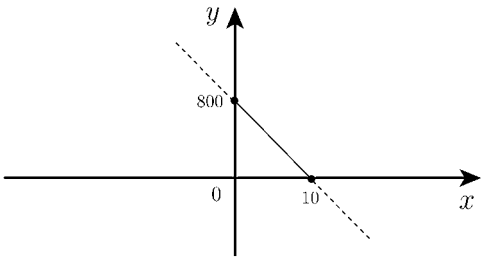
$y = 15 - 0.5x \quad (0 \leqq x \leqq 30)$



問 2 の解答

x 分後に $80x$(m) 歩くから，

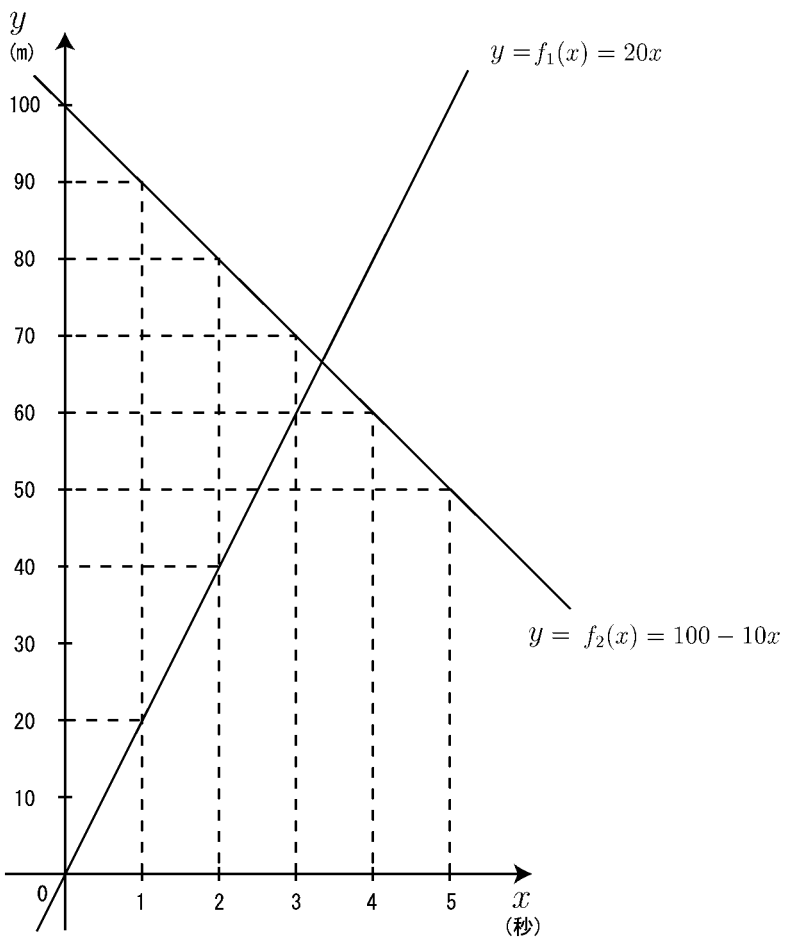
$y = 800 - 80x$



問 3 の解答

(1) $f_1(x) = 20x$ ， (2)$f_2(x) = 100 - 10x$

(2)



(3) $f_1(x) = f_2(x) \Rightarrow 20x = 100 - 10x \Rightarrow 30x = 100$

$x = \frac{10}{3}$ ， $y = \frac{200}{3}$ (答) $\left(\frac{10}{3}, \frac{200}{3}\right)$

(4) $\frac{10}{3}$ 秒後に A 地点から $\frac{200}{3}$m の地点で 2 つの車が出会う

< 38 ページ.2 次式の変形 >

問の解答

(1) $x^2+8x=(x+4)^2-16$

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

(3) $x^2+x+1=\left(x+\dfrac{1}{2}\right)^2+\dfrac{3}{4}$

(4) $x^2-3x-1=\left(x-\dfrac{3}{2}\right)^2-\dfrac{13}{4}$

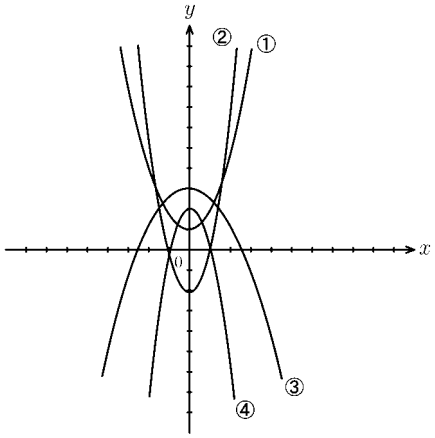
(5) $2x^2-8x+3=2(x-2)^2-5$

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

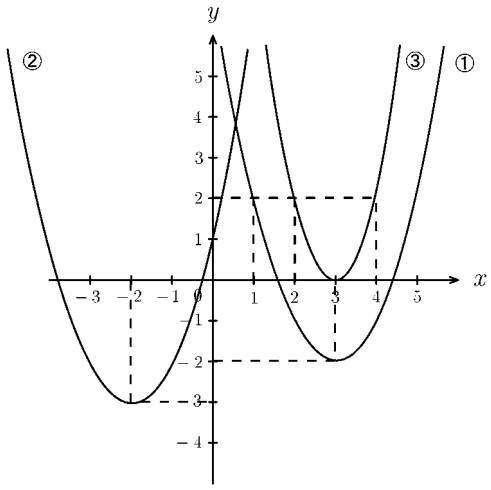
(7) $2x^2+5x+2=2\left(x+\dfrac{5}{4}\right)^2-\dfrac{9}{8}$

< 39 ページ.2 次関数のグラフ (1) >

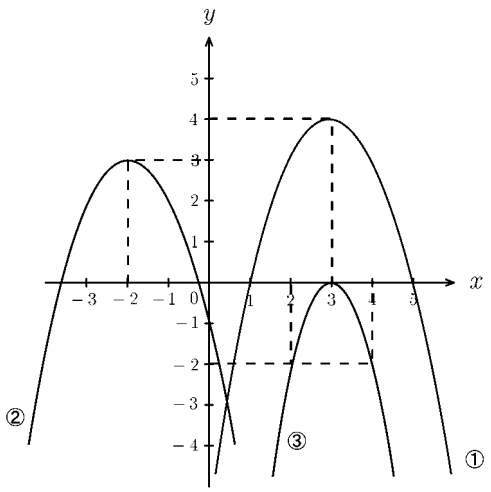
問 1 の解答



問 2 の解答



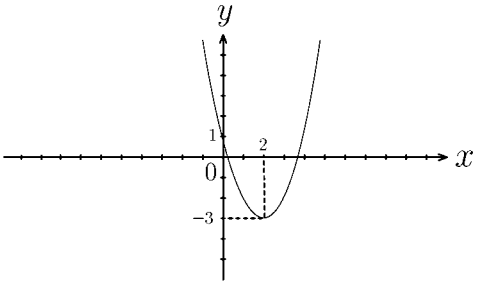
問 3 の解答



< 40 ページ.2 次関数グラフ (2) >

問の解答

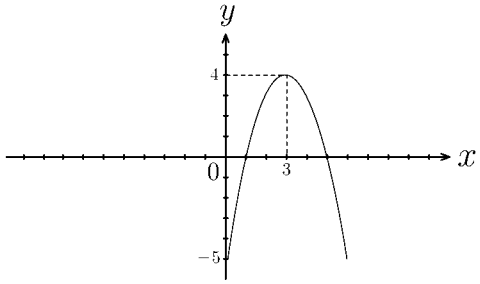
(1) $y = x^2 - 4x + 1 = (x-2)^2 - 3$



頂点 (2, -3)

x 切片 $(2+\sqrt{3},\ 0)$, $(2-\sqrt{3},\ 0)$

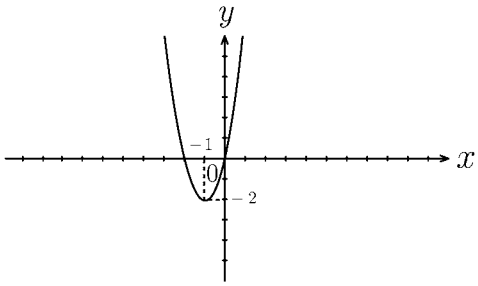
(2) $y = -x^2 + 6x - 5 = -(x-3)^2 + 4$



頂点 (3, 4)

x 切片 (1, 0), (5, 0)

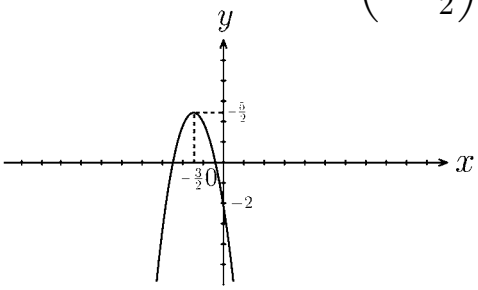
(3) $y = 2x^2 + 4x = 2(x+1)^2 - 2$



頂点 (-1, -2)

x 切片 (0, 0), (-2, 0)

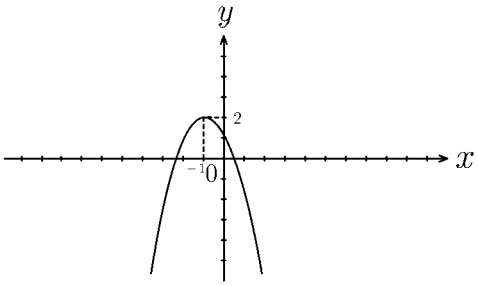
(4) $y = -2x^2 - 6x - 2 = -2\left(x + \dfrac{3}{2}\right)^2 + \dfrac{5}{2}$



頂点 $\left(-\dfrac{3}{2},\ \dfrac{5}{2}\right)$

x 切片 $\left(-\dfrac{3+\sqrt{5}}{2},\ 0\right)$, $\left(-\dfrac{3-\sqrt{5}}{2},\ 0\right)$

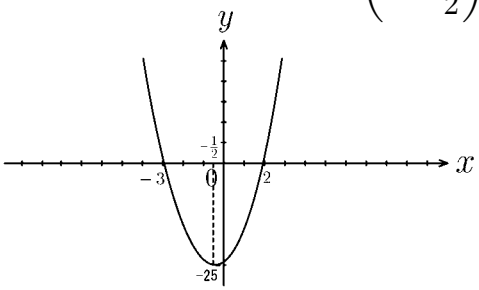
(5) $y = -x^2 - 2x + 1 = -(x+1)^2 + 2$



頂点 (-1, 2)

x 切片 $(-1+\sqrt{2},\ 0)$, $(-1-\sqrt{2},\ 0)$

(6) $y = 2x^2 + 2x - 12 = 2\left(x + \dfrac{1}{2}\right)^2 - \dfrac{25}{2}$

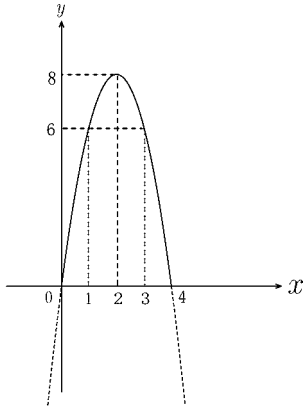


頂点 $\left(-\dfrac{1}{2},\ -\dfrac{25}{2}\right)$

x 切片 (2, 0), (-3, 0)

< 41 ページ.2 次関数の最大・最小 (1) >

問 1 の解答



(1) $y = 2x(4-x) \qquad (0 \leqq x \leqq 4)$

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

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

$x = 2$ のとき最大値 $y = 8$

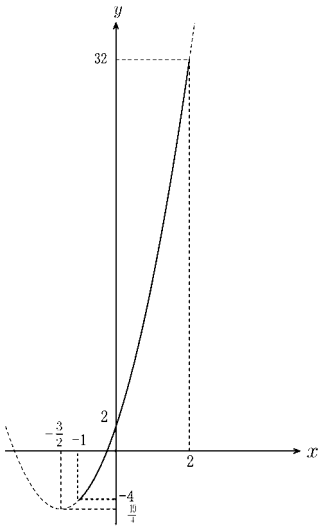
$x = 0$ または $x = 4$ のとき最小値 $y = 0$

(2) $y = 3x^2 + 9x + 2 \qquad (-1 \leqq x \leqq 2)$

$= 3(x^2 + 3x) + 2 = 3\left\{\left(x + \dfrac{3}{2}\right)^2 - \dfrac{9}{4}\right\} + 2$

$= 3\left(x + \dfrac{3}{2}\right)^2 - \dfrac{27}{4} + 2$

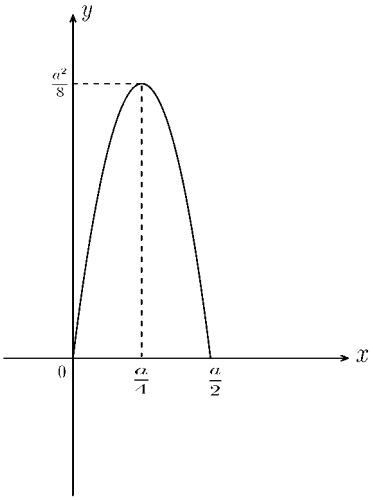
$= 3\left(x + \dfrac{3}{2}\right)^2 - \dfrac{19}{4}$



$x = 2$ のとき最大値 $y = 32$

$x = -1$ のとき最小値 $y = -4$

問 2 の解答



$a - 2x > 0 \;\Rightarrow\; 0 < x < \dfrac{a}{2}$

$y = x(a-2x) = -2x^2 + ax = -2\left(x^2 - \dfrac{a}{2}x\right)$

$= -2\left\{(x - \dfrac{a}{4})^2 - \dfrac{a^2}{16}\right\} = -2\left(x - \dfrac{a}{4}\right)^2 + \dfrac{a^2}{8}$

(答) $\underline{x = \dfrac{a}{4}(\mathrm{cm})}$

< 42 ページ.2 次関数の最大・最小 (2) >

問 1 の解答

(1) $y = -4.9(t^2 - 4t) = -4.9\big\{(t-2)^2 - 4\big\} = -4.9(t-2)^2 + 19.6$

(答) $t = 2$ のとき最大値 $y = 19.6$

(2) 2 秒後

(3) 19.6m

(4) $y = 0 \Rightarrow -4.9(t^2 - 4t) = 0 \Rightarrow t = 0,\ 4$

(答) 4 秒後

問 2 の解答

(1)$y = -4.9(t^2 - 6t - 7) = -4.9\left\{(t-3)^2 - 16\right\} = -4.9(t-3)^2 + 78.4$

(答) 3 秒後

(2) (答)78.4m

(3) $y = -4.9(t^2 - 6t - 7) = 0$

$(t-7)(t+1) = 0$

(答) 7 秒後