

1

- 解答 I (1) 2 (2) 2  
II (1) 1 (2) 1 (3) 2  
III (1) 1 (2) 1  
IV (1) 2 (2) 1 (3) 2

2

- 解答 I (1)  $\sqrt{35}$  (2) 9 (3)  $\sqrt{5}$  (4) 4  
II (1)  $\sqrt{12}$  (2)  $\sqrt{7}$   
III (1)  $3\sqrt{5}$  (2)  $2\sqrt{13}$   
IV (1)  $\frac{\sqrt{2}}{2}$  (2)  $\frac{\sqrt{3}}{2}$

3

- 解答 (1)  $7\sqrt{3}$  (2)  $6\sqrt{5}$  (3)  $84\sqrt{10}$  (4)  $3\sqrt{6}$  (5)  $-4\sqrt{5}$

4

- 解答 (1)  $7-2\sqrt{10}$  (2)  $-6$  (3)  $4\sqrt{3}$  (4)  $\frac{5}{4}$  (5)  $6-3\sqrt{3}$

5

- 解答 (1)  $x = \pm 2$  (2)  $x = \pm 2\sqrt{2}$  (3)  $x = 0, 4$  (4)  $x = -3, 4$   
(5)  $x = \frac{3 \pm \sqrt{37}}{14}$  (6)  $x = \frac{-1 \pm \sqrt{3}}{2}$  (7)  $x = 0, -3$  (8)  $x = 2, -12$

1

解説

I (1)  $6^2=36$ ,  $(-6)^2=36$     6, -6

(2)  $\sqrt{7}$ ,  $-\sqrt{7}$

II (1)  $(\sqrt{5})^2=5$

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

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

III (1)  $\sqrt{4}=\sqrt{2^2}=2$

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

$-\sqrt{36}=-\sqrt{6^2}=-6$

IV (1)  $6<7$ であるから  $\sqrt{6}<\sqrt{7}$

(2)  $5=\sqrt{25}$  で,  $26>25$ であるから

$$\sqrt{26}>\sqrt{25}$$

よって  $\sqrt{26}>5$

(3)  $2=\sqrt{4}$  で,  $5>4$ であるから

$$\sqrt{5}>\sqrt{4}$$

すなわち  $\sqrt{5}>2$

よって  $-\sqrt{5}<-2$

2

解説

I

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

(2)  $\sqrt{3} \times \sqrt{27} = \sqrt{3 \times 27}$   
 $= \sqrt{81}$   
 $= 9$

(3)  $\sqrt{15} \div \sqrt{3} = \frac{\sqrt{15}}{\sqrt{3}}$   
 $= \sqrt{\frac{15}{3}}$   
 $= \sqrt{5}$

(4)  $\sqrt{80} \div \sqrt{5} = \frac{\sqrt{80}}{\sqrt{5}}$   
 $= \sqrt{\frac{80}{5}}$   
 $= \sqrt{16}$

$$=4$$

II

$$\begin{aligned}(1) \quad 2\sqrt{3} &= 2 \times \sqrt{3} \\ &= \sqrt{2^2} \times \sqrt{3} \\ &= \sqrt{2^2 \times 3} \\ &= \sqrt{12}\end{aligned}$$

$$\begin{aligned}(2) \quad \frac{\sqrt{28}}{2} &= \frac{\sqrt{28}}{\sqrt{2^2}} \\ &= \sqrt{\frac{28}{2^2}} \\ &= \sqrt{7}\end{aligned}$$

III

$$\begin{aligned}(1) \quad \sqrt{45} &= \sqrt{9 \times 5} \\ &= \sqrt{9} \times \sqrt{5} \\ &= 3\sqrt{5}\end{aligned}$$

$$\begin{aligned}(2) \quad \sqrt{52} &= \sqrt{4 \times 13} \\ &= \sqrt{4} \times \sqrt{13} \\ &= 2\sqrt{13}\end{aligned}$$

IV

$$\begin{aligned}(1) \quad \frac{1}{\sqrt{2}} &= \frac{1 \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}} \\ &= \frac{\sqrt{2}}{2}\end{aligned}$$

$$\begin{aligned}(2) \quad \frac{3}{2\sqrt{3}} &= \frac{3 \times \sqrt{3}}{2\sqrt{3} \times \sqrt{3}} \\ &= \frac{3 \times \sqrt{3}}{2 \times 3} \\ &= \frac{3\sqrt{3}}{6} \\ &= \frac{\sqrt{3}}{2}\end{aligned}$$

3

解説

$$\begin{aligned}(1) \quad \sqrt{7} \times \sqrt{21} &= \sqrt{7 \times 21} \\ &= \sqrt{7 \times 3 \times 7} \\ &= \sqrt{7^2 \times 3} \\ &= 7\sqrt{3}\end{aligned}$$

$$\begin{aligned}
 (2) \quad \sqrt{6} \times \sqrt{30} &= \sqrt{6 \times 30} \\
 &= \sqrt{2 \times 3 \times 2 \times 3 \times 5} \\
 &= \sqrt{6^2 \times 5} \\
 &= 6\sqrt{5}
 \end{aligned}$$

$$\begin{aligned}
 (3) \quad 4\sqrt{6} \times 7\sqrt{15} &= 4 \times 7 \times \sqrt{6} \times \sqrt{15} \\
 &= 28 \times \sqrt{6 \times 15} \\
 &= 28 \times \sqrt{3^2 \times 2 \times 5} \\
 &= 28 \times 3 \times \sqrt{2 \times 5} \\
 &= 84\sqrt{10}
 \end{aligned}$$

$$\begin{aligned}
 (4) \quad \sqrt{6} + \sqrt{24} &= \sqrt{6} + 2\sqrt{6} \\
 &= 3\sqrt{6}
 \end{aligned}$$

$$\begin{aligned}
 (5) \quad \sqrt{5} - \sqrt{20} - \sqrt{45} &= \sqrt{5} - 2\sqrt{5} - 3\sqrt{5} \\
 &= -4\sqrt{5}
 \end{aligned}$$

4

解説

$$\begin{aligned}
 (1) \quad (\sqrt{2} - \sqrt{5})^2 &= (\sqrt{2})^2 - 2 \times \sqrt{5} \times \sqrt{2} + (\sqrt{5})^2 \\
 &= 2 - 2\sqrt{10} + 5 \\
 &= 7 - 2\sqrt{10}
 \end{aligned}$$

$$\begin{aligned}
 (2) \quad (4\sqrt{3} + 3\sqrt{6})(4\sqrt{3} - 3\sqrt{6}) &= (4\sqrt{3})^2 - (3\sqrt{6})^2 \\
 &= 48 - 54 \\
 &= -6
 \end{aligned}$$

$$\begin{aligned}
 (3) \quad 3\sqrt{12} - \frac{15}{\sqrt{3}} + \sqrt{27} &= 3 \times 2\sqrt{3} - \frac{15 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} + 3\sqrt{3} \\
 &= 6\sqrt{3} - \frac{15\sqrt{3}}{3} + 3\sqrt{3} \\
 &= 6\sqrt{3} - 5\sqrt{3} + 3\sqrt{3} \\
 &= 4\sqrt{3}
 \end{aligned}$$

$$\begin{aligned}
 (4) \quad \frac{(\sqrt{7} + 2)(\sqrt{7} - 2)}{\sqrt{6}} + \frac{(\sqrt{3} - \sqrt{2})^2}{4} &= \frac{7 - 4}{\sqrt{6}} + \frac{3 - 2\sqrt{6} + 2}{4} \\
 &= \frac{\sqrt{6}}{2} + \frac{5 - 2\sqrt{6}}{4} \\
 &= \frac{5}{4}
 \end{aligned}$$

$$\begin{aligned}
 (5) \quad \frac{4\sqrt{3}}{\sqrt{3} - 1} - \frac{24}{\sqrt{3}} + \sqrt{27} &= \frac{4\sqrt{3}(\sqrt{3} + 1)}{(\sqrt{3} - 1)(\sqrt{3} + 1)} - \frac{24 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} + \sqrt{3^2 \times 3} \\
 &= \frac{4\sqrt{3}(\sqrt{3} + 1)}{3 - 1} - \frac{24\sqrt{3}}{3} + 3\sqrt{3}
 \end{aligned}$$

$$\begin{aligned}
&= 2\sqrt{3}(\sqrt{3} + 1) - 8\sqrt{3} + 3\sqrt{3} \\
&= 6 + 2\sqrt{3} - 8\sqrt{3} + 3\sqrt{3} \\
&= 6 - 3\sqrt{3}
\end{aligned}$$

5

解説

(1) (2) 解説略

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

左辺を因数分解すると  $x(x - 4) = 0$

よって  $x = 0$  または  $x - 4 = 0$

したがって  $x = 0, 4$

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

左辺を因数分解すると  $(x + 3)(x - 4) = 0$

よって  $x + 3 = 0$  または  $x - 4 = 0$

したがって  $x = -3, 4$

(5)  $7x^2 - 3x - 1 = 0$

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4 \times 7 \times (-1)}}{2 \times 7} = \frac{3 \pm \sqrt{37}}{14}$$

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

$$x = \frac{-2 \pm \sqrt{2^2 - 4 \times 2 \times (-1)}}{2 \times 2} = \frac{-2 \pm \sqrt{12}}{4} = \frac{-2 \pm 2\sqrt{3}}{4} = \frac{-1 \pm \sqrt{3}}{2}$$

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

$$3x^2 + 2x = x^2 - 4x$$

$$2x^2 + 6x = 0$$

$$x^2 + 3x = 0$$

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

$$x = 0, -3$$

(8)  $\frac{x^2 - 2}{2} - \frac{x^2 - 5x}{3} = 3$

$$3(x^2 - 2) - 2(x^2 - 5x) = 18$$

$$3x^2 - 6 - 2x^2 + 10x = 18$$

$$x^2 + 10x - 24 = 0$$

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

$$x = -12, 2$$