数学 I　P32解説

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6 (1) $|0-3|-|0+2|=|-3|-|2|=3-2=1$

(2) $|5-3|-|5+2|=|2|-|7|=2-7=-5$

(3) $|-4-3|-|-4+2|=|-7|-|-2|=7-2=5$

7 (1) $x=3$ のとき
$$\sqrt{(x+1)^2}=\sqrt{(3+1)^2}=\sqrt{4^2}=4$$

(2) $x=-1$ のとき
$$\sqrt{(x+1)^2}=\sqrt{(-1+1)^2}=\sqrt{0}=0$$

(3) $x=-3$ のとき
$$\sqrt{(x+1)^2}=\sqrt{(-3+1)^2}=\sqrt{(-2)^2}=\sqrt{4}=2$$

別解　$\sqrt{(x+1)^2}=|x+1|$

(1) $x=3$ のとき　$|x+1|=|3+1|=|4|=4$

(2) $x=-1$ のとき　$|x+1|=|-1+1|=|0|=0$

(3) $x=-3$ のとき　$|x+1|=|-3+1|=|-2|=2$

8 (1) $2\sqrt{27}-3\sqrt{12}+\sqrt{54}=2\cdot3\sqrt{3}-3\cdot2\sqrt{3}+3\sqrt{6}$
$$=6\sqrt{3}-6\sqrt{3}+3\sqrt{6}=3\sqrt{6}$$

(2) $(\sqrt{3}+\sqrt{6})^2=(\sqrt{3})^2+2\sqrt{3}\sqrt{6}+(\sqrt{6})^2$
$$=3+2\cdot3\sqrt{2}+6$$
$$=9+6\sqrt{2}$$

(3) $\dfrac{\sqrt{3}-1}{\sqrt{8}}=\dfrac{(\sqrt{3}-1)\sqrt{2}}{2\sqrt{2}\sqrt{2}}=\dfrac{\sqrt{6}-\sqrt{2}}{2\cdot2}=\dfrac{\sqrt{6}-\sqrt{2}}{4}$

(4) $\dfrac{2\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}=\dfrac{(2\sqrt{3}+\sqrt{2})(\sqrt{3}+\sqrt{2})}{(\sqrt{3}-\sqrt{2})(\sqrt{3}+\sqrt{2})}$
$$=\dfrac{2\sqrt{3}\sqrt{3}+2\sqrt{3}\sqrt{2}+\sqrt{2}\sqrt{3}+(\sqrt{2})^2}{(\sqrt{3})^2-(\sqrt{2})^2}$$
$$=2\cdot3+2\sqrt{6}+\sqrt{6}+2$$
$$=8+3\sqrt{6}$$

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

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

9 (1) $\dfrac{1}{\sqrt{2}}=\dfrac{\sqrt{2}}{\sqrt{2}\sqrt{2}}=\dfrac{\sqrt{2}}{2}=\dfrac{1.4142}{2}=0.7071$

(2) $\dfrac{\sqrt{2}}{\sqrt{2}-1}=\dfrac{\sqrt{2}(\sqrt{2}+1)}{(\sqrt{2}-1)(\sqrt{2}+1)}=\dfrac{2+\sqrt{2}}{(\sqrt{2})^2-1^2}=2+\sqrt{2}$
$$=2+1.4142=3.4142$$

$\boxed{10}$ $x = \dfrac{\sqrt{5} - \sqrt{3}}{\sqrt{5} + \sqrt{3}} = \dfrac{(\sqrt{5} - \sqrt{3})^2}{(\sqrt{5} + \sqrt{3})(\sqrt{5} - \sqrt{3})} = \dfrac{8 - 2\sqrt{15}}{2} = 4 - \sqrt{15}$

$y = \dfrac{\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}} = \dfrac{(\sqrt{5} + \sqrt{3})^2}{(\sqrt{5} - \sqrt{3})(\sqrt{5} + \sqrt{3})} = \dfrac{8 + 2\sqrt{15}}{2} = 4 + \sqrt{15}$

$x + y = (4 - \sqrt{15}) + (4 + \sqrt{15}) = 8$

$xy = \dfrac{\sqrt{5} - \sqrt{3}}{\sqrt{5} + \sqrt{3}} \cdot \dfrac{\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}} = 1$

(1) $x^2 + y^2 = (x + y)^2 - 2xy = 8^2 - 2 \cdot 1 = 62$

(2) $x^3 y + x y^3 = xy(x^2 + y^2) = 1 \cdot 62 = 62$

(3) $\dfrac{x}{y} + \dfrac{y}{x} = \dfrac{x^2 + y^2}{xy} = \dfrac{62}{1} = 62$

$\boxed{11}$ $\dfrac{2}{\sqrt{3} - 1} = \dfrac{2(\sqrt{3} + 1)}{(\sqrt{3} - 1)(\sqrt{3} + 1)} = \sqrt{3} + 1$

$1 < \sqrt{3} < 2$ であるから $\quad 2 < \sqrt{3} + 1 < 3$

よって $\quad a = 2,\ b = (\sqrt{3} + 1) - 2 = \sqrt{3} - 1$

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