

基礎数学α 小課題第6回

裏面にある略解をもとに丸付けをすること。裏面も解答に使ってもよいです。授業の質問も書いてくれれば回答します。名前等、忘れずにていねいに書いてください！

$$|a| = \begin{cases} a & (a \geq 0) \\ -a & (a < 0) \end{cases}$$

1年 ___ 科 ___ 番氏名 _____

1. 次の値を求めよ。

(1) $|\sqrt{5}-3|$

$$4 < 5 < 9 \pm 4 \\ 2 < \sqrt{5} < 3$$

$$\therefore \underbrace{|\sqrt{5}-3|}_{\ominus} = -(\sqrt{5}-3) = 3-\sqrt{5}$$

(2) $\sqrt{(1-\sqrt{3})^2}$

$$= \underbrace{|1-\sqrt{3}|}_{\ominus}$$

$$= -(1-\sqrt{3}) = \sqrt{3}-1$$

$$1 < 3 < 4 \\ \downarrow \sqrt{} \\ 1 < \sqrt{3} < 2$$

(3) $\sqrt{(-1204)^2}$

$$= |-1204| = 1204$$

(4) $\underbrace{|\pi^2-16|}_{\ominus}$

$$= -(\pi^2-16) = 16-\pi^2$$

$$\pi < 4 \neq 4$$

$$\pi^2 < 16$$

$$\text{もしくは, } \pi^2 - 16$$

$$= (\pi-4)(\pi+4)$$

$$\ominus \oplus < 0$$

2. 次の式を簡単にせよ。

(1) $3\sqrt{32} - 2\sqrt{72} + 4\sqrt{8}$

$$= 12\sqrt{2} - 12\sqrt{2} + 8\sqrt{2} = 8\sqrt{2}$$

(2) $\sqrt{42} \times \sqrt{30} \div \sqrt{140}$

$$= \sqrt{\frac{42 \times 30}{140}} = \sqrt{\frac{2 \times 3 \times 7 \times 2 \times 5}{2 \times 7 \times 10}} = \sqrt{9} = 3$$

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

$$= (20 - 4\sqrt{15} + 3) - (5 + \sqrt{15} - 18) = 36 - 5\sqrt{15}$$

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

$$= (\sqrt{2}+\sqrt{5}+\sqrt{3})(\sqrt{2}+\sqrt{5}-\sqrt{3}) = (0+\Delta)(0-\Delta) = 0^2 - \Delta^2 = (\sqrt{2}+\sqrt{5})^2 - 3 = (2+2\sqrt{10}+5)-3 = 4+2\sqrt{10}$$

3. 次の式の分母を有理化せよ。

(1) $\frac{1}{\sqrt{11}+\sqrt{5}} \times \frac{\sqrt{11}-\sqrt{5}}{\sqrt{11}-\sqrt{5}}$

$$= \frac{\sqrt{11}-\sqrt{5}}{11-5} = \frac{\sqrt{11}-\sqrt{5}}{6}$$

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

$$= \frac{4\sqrt{2}+\sqrt{12}}{16-6} = \frac{4\sqrt{2}+2\sqrt{3}}{10} = \frac{2\sqrt{2}+\sqrt{3}}{5}$$

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

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

4. $x = \frac{3}{\sqrt{5}-\sqrt{2}}$, $y = \frac{3}{\sqrt{5}+\sqrt{2}}$ のとき、次の値を求めよ。

(1) $x+y$

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

$$= \frac{6\sqrt{5}}{5-2}$$

$$= 2\sqrt{5}$$

(4) x^3+y^3 $\begin{matrix} x^2+y^2=14 \\ xy=3 \\ \downarrow \end{matrix}$

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

$$= 2\sqrt{5} \times (14-3)$$

$$= 22\sqrt{5}$$

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

$$= \frac{9}{5-2}$$

$$= 3$$

(5) x^3y+xy^3

$$= xy(x^2+y^2)$$

$$= 3 \times 14$$

$$= 42$$

(3) x^2+y^2

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

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

$$= 14$$

$x+y, xy$ を

表わそう!

1. (1) $3-\sqrt{5}$ (2) $\sqrt{3}-1$ (3) 1204 (4) $16-\pi^2$
 2. (1) $8\sqrt{2}$ (2) 3 (3) $36-5\sqrt{15}$ (4) $4+2\sqrt{10}$
 3. (1) $\frac{6}{\sqrt{11}-\sqrt{5}}$ (2) $\frac{5}{2\sqrt{2}+\sqrt{3}}$ (3) $5-2\sqrt{6}$
 4. (1) $2\sqrt{5}$ (2) 3 (3) 14 (4) $22\sqrt{5}$ (5) 42