1 次の式を計算せよ。

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

(3) $\dfrac{1}{2+\sqrt{5}}+\dfrac{\sqrt{5}-3}{\sqrt{5}+1}$　　(4) $\dfrac{\sqrt{7}}{\sqrt{7}-\sqrt{5}}-\dfrac{\sqrt{5}}{\sqrt{7}+\sqrt{5}}$

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

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

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

$=6+2\sqrt{2}-2\sqrt{3}-2\sqrt{6}$

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

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

$=1-(2-2\cdot2\cdot\sqrt{3}+6)$

$=-7+4\sqrt{3}$

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

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

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

$=-2+\sqrt{5}+2-\sqrt{5}$

$=0$

(4) $\dfrac{\sqrt{7}(\sqrt{7}+\sqrt{5})-\sqrt{5}(\sqrt{7}-\sqrt{5})}{(\sqrt{7}-\sqrt{5})(\sqrt{7}+\sqrt{5})}$

$=\dfrac{7+\sqrt{35}-\sqrt{35}+5}{7-5}$

$=\dfrac{12}{2}$

$=6$

2 $x=\dfrac{2}{\sqrt{3}+1}$，$y=\dfrac{2}{\sqrt{3}-1}$ のとき，次の式の値を求めよ。

(1) $x+y$　(2) xy　(3) x^2y+xy^2　(4) x^2+y^2　(5) x^3+y^3

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

$x=\sqrt{3}-1$

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

$y=\sqrt{3}+1$

(3),(4),(5)は
(1),(2)の
基本対称式
を利用する!!

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

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

(3) $x^2y+xy^2=xy(x+y)=2\times2\sqrt{3}=4\sqrt{3}$

(4) $x^2+y^2=(x+y)^2-2xy=(2\sqrt{3})^2-2\cdot2$

$=12-4=8$

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

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

$=2\sqrt{3}\times(8-2)=12\sqrt{3}$

(4)を
利用する!!

$(x+y)^3-3xy(x+y)$

$=24\sqrt{3}-3\cdot2\cdot2\sqrt{3}$

$=24\sqrt{3}-12\sqrt{3}=12\sqrt{3}$

3 $\dfrac{1-\sqrt{2}+\sqrt{3}}{1+\sqrt{2}+\sqrt{3}}$ の分母を有理化せよ。

$$\frac{1+\sqrt{3}-\sqrt{2}}{1+\sqrt{3}+\sqrt{2}}\times\frac{1+\sqrt{3}-\sqrt{2}}{1+\sqrt{3}-\sqrt{2}}$$

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

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

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

$$=\frac{3+\sqrt{3}-\sqrt{2}-\sqrt{6}}{1+\sqrt{3}}\times\frac{1-\sqrt{3}}{1-\sqrt{3}}$$

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

$$=\frac{-2\sqrt{3}+2\sqrt{2}}{-2}$$

$$=\sqrt{3}-\sqrt{2}$$

3つの有理化は、2回やる!!

4 $\dfrac{1}{2-\sqrt{3}}$ の整数部分を a，小数部分を b とする。次の式の値を求めよ。

(1)　a　　(2)　b　　(3)　$a+2b+b^2+1$

$$\frac{1}{2-\sqrt{3}}\times\frac{2+\sqrt{3}}{2+\sqrt{3}}$$

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

$$=2+\sqrt{3}$$

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

$$3<2+\sqrt{3}<4$$

(1) $a=3$

(2) $b=2+\sqrt{3}-3$ より

$b=\sqrt{3}-1$

(3) $a+2b+b^2+1$

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

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

$=3+\sqrt{3}^2=6$

因数分解してから代入!!

5 $\sqrt{2}=1.4142$，$\sqrt{5}=2.2361$ とするとき，次の値を求めよ。

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

(1) $\dfrac{1}{\sqrt{5}}\times\dfrac{\sqrt{5}}{\sqrt{5}}=\dfrac{\sqrt{5}}{5}=\dfrac{2.2361}{5}=0.44722$

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

$=\dfrac{\sqrt{2}}{2}=\dfrac{1.4142}{2}=0.7071$

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

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

$=\sqrt{5}+\sqrt{2}=2.2361+1.4142$

$=3.6503$

<今日のふりかえり>