

1. $\sqrt[3]{(-2)^3} + \sqrt[4]{(-3)^4}$ 을 간단히 하면?

① -5

② -1

③ 0

④ 1

⑤ 5

해설

$$-2 + 3 = 1$$

2. $\left\{\left(\frac{4}{9}\right)^{-\frac{2}{3}}\right\}^{\frac{9}{4}}$ 의 값은?

① $\frac{8}{27}$

② $\frac{16}{61}$

③ $\frac{81}{16}$

④ $\frac{27}{8}$

⑤ $\frac{64}{81}$

해설

$$\begin{aligned}\left\{\left(\frac{4}{9}\right)^{-\frac{2}{3}}\right\}^{\frac{9}{4}} &= \left(\frac{4}{9}\right)^{-\frac{2}{3} \times \frac{9}{4}} = \left(\frac{4}{9}\right)^{-\frac{3}{2}} \\&= \left\{\left(\frac{2}{3}\right)^2\right\}^{-\frac{3}{2}} = \left(\frac{2}{3}\right)^{2 \times (-\frac{3}{2})} = \left(\frac{2}{3}\right)^{(-3)} \\&= \left(\frac{8}{27}\right)^{-1} = \frac{27}{8}\end{aligned}$$

3. $\sqrt[4]{4 + \sqrt{15}} \times \sqrt{\sqrt{5} - \sqrt{3}} \times \sqrt[4]{8}$ 을 간단히 하면?

- ① 1 ② $\sqrt{2}$ ③ 2 ④ $2\sqrt{2}$ ⑤ 4

해설

$$\begin{aligned} & \sqrt[4]{4 + \sqrt{15}} \times \sqrt{\sqrt{5} - \sqrt{3}} \times \sqrt[4]{8} \\ &= \sqrt{\sqrt{\frac{8 + 2\sqrt{15}}{2}}} \times \sqrt{\sqrt{5} - \sqrt{3}} \times \sqrt[4]{8} \\ &= \frac{\sqrt{\sqrt{5} + \sqrt{3}}}{\sqrt{\sqrt{2}}} \times \sqrt{\sqrt{5} - \sqrt{3}} \times \sqrt[4]{8} \\ &= \frac{\sqrt{5 - 3}}{\sqrt[4]{2}} \times \sqrt[4]{8} \\ &= \sqrt{2} \times \sqrt[4]{\frac{8}{2}} \\ &= \sqrt{2} \times \sqrt[4]{4} \\ &= \sqrt{2} \times \sqrt{2} \\ &= 2 \end{aligned}$$

4. $\sqrt{a\sqrt{a\sqrt{a}}}$ 을 간단히 하면 $a^{\frac{n}{m}}$ 이다. 이때, $m-n$ 의 값을 구하여라.
(단, m, n 은 서로소인 자연수)

▶ 답 :

▷ 정답 : 1

해설

$$\begin{aligned}\sqrt{a\sqrt{a\sqrt{a}}} &= \sqrt{a\sqrt{a^{\frac{3}{2}}}} \\ &= \sqrt{a \cdot a^{\frac{3}{4}}} \\ &= (a^{\frac{7}{4}})^{\frac{1}{2}} = a^{\frac{7}{8}} \\ n &= 7, m = 8 \\ 8 - 7 &= 1\end{aligned}$$

5. $(3 - \sqrt{2})^{-1} \times (11 + 6\sqrt{2})^{-\frac{1}{2}} = a$ 일 때, $\frac{1}{a}$ 의 값을 구하여라.

▶ 답 :

▷ 정답 : 7

해설

$$\begin{aligned} a &= \frac{1}{3 - \sqrt{2}} \times \frac{1}{\sqrt{11 + 2\sqrt{18}}} \\ &= \frac{1}{(3 - \sqrt{2}) \times (3 + \sqrt{2})} = \frac{1}{7} \\ \therefore \frac{1}{a} &= \frac{1}{7} \end{aligned}$$

6. $x = \sqrt{2} - \frac{1}{\sqrt{2}}$ 일 때, $\sqrt{x^2 + 4}$ 의 값은?

① $\sqrt{2} - \frac{1}{\sqrt{2}}$

② $\sqrt{2} + \frac{1}{\sqrt{2}}$

③ $\sqrt[4]{2} - \frac{1}{\sqrt[4]{2}}$

④ $\sqrt[4]{2} + \frac{1}{\sqrt[4]{2}}$

⑤ $\sqrt[8]{2} + \frac{1}{\sqrt[8]{2}}$

해설

$$x^2 + 4 = 2^{\frac{1}{4}} + 2 + 2^{-\frac{1}{4}} = \left(2^{\frac{1}{8}} + 2^{-\frac{1}{8}}\right)^2$$

$$\therefore \sqrt{x^2 + 4} = 2^{\frac{1}{8}} + 2^{-\frac{1}{8}} = \sqrt[8]{2} + \frac{1}{\sqrt[8]{2}}$$

7. $x > 0$ 이고 $x + x^{-1} = 3$ 일 때, $x^{\frac{3}{2}} + x^{-\frac{3}{2}}$ 의 값은?

- ① $\sqrt{5}$ ② $2\sqrt{5}$ ③ $3\sqrt{5}$ ④ $4\sqrt{5}$ ⑤ $5\sqrt{5}$

해설

$$\left(x^{\frac{1}{2}} + x^{-\frac{1}{2}}\right)^2 = x + x^{-1} + 2 \text{에서}$$

$$\left(x^{\frac{1}{2}} + x^{-\frac{1}{2}}\right)^2 = 3 + 2 = 5 \text{이므로}$$

$$\text{이 때, } x^{\frac{1}{2}} + x^{-\frac{1}{2}} > 0 \text{이므로 } x^{\frac{1}{2}} + x^{-\frac{1}{2}} = \sqrt{5}$$

$$\therefore x^{\frac{3}{2}} + x^{-\frac{3}{2}} = \left(x^{\frac{1}{2}} + x^{-\frac{1}{2}}\right)^3 - 3 \cdot x^{\frac{1}{2}} \cdot x^{-\frac{1}{2}} \left(x^{\frac{1}{2}} + x^{-\frac{1}{2}}\right)$$

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

8. $A = \sqrt[3]{9}$, $B = \sqrt{27}$, $C = \sqrt[4]{81}$ 일 때, A, B, C 의 대소관계를 바르게 나타낸것은?

- ① $A < C < B$ ② $C < A < B$ ③ $B < A < C$
④ $B < C < A$ ⑤ $A < B < C$

해설

$$\sqrt[3]{9} = 3^{\frac{2}{3}}$$

$$\sqrt{27} = 3^{\frac{3}{2}}$$

$$\sqrt[4]{81} = 3^{\frac{4}{4}} = 3$$

$$\therefore A < C < B$$