1. $\sqrt[3]{a^2} \div \sqrt[3]{a^{-5}} \times \left(-a^{\frac{2}{3}}\right)^4$ 을 간단히 하면? (단, $a > o$)

① a　　② $a^{\frac{4}{3}}$　　③ a^2　　④ a^4　　⑤ a^5

해설

$$\begin{aligned}\sqrt[3]{a^2} \div \sqrt[3]{a^{-5}} \times \left(-a^{\frac{2}{3}}\right)^4 &= a^{\frac{2}{3}} \div a^{-\frac{3}{5}} \times a^{\frac{8}{3}} \\ &= a^{\frac{2}{3}-\left(-\frac{5}{3}\right)+\frac{8}{3}} \\ &= a^5\end{aligned}$$

2. $\log_8 0.25 = x$를 만족하는 x의 값은?

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

해설

$\log_8 0.25 = x$에서 $8^x = 0.25$

$(2^3)^x = \frac{1}{4}$ $\therefore$ $2^{3x} = 2^{-2}$

$\therefore$ $3x = -2$

$\therefore$ $x = -\frac{2}{3}$

3. $\dfrac{\sqrt[3]{250}-\sqrt[3]{54}}{2\sqrt[3]{4}} = 2^k$ 이 성립할 때, k 의 값은?

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

해설

$$(\text{주어진식}) = \frac{5\sqrt[3]{2}-3\sqrt[3]{2}}{2\sqrt[3]{2^2}} = \frac{2\sqrt[3]{2}}{2\sqrt[3]{2^2}} = 2^{\frac{1}{3}-\frac{2}{3}} = 2^{-\frac{1}{3}}$$

$\therefore k = -\dfrac{1}{3}$

4. $a = 5 \times 729^x$ 일 때, 27^x 을 a 에 관한 식으로 나타내면?

① $\left(\frac{a}{5}\right)^{\frac{1}{4}}$ ② $\left(\frac{a}{5}\right)^{\frac{1}{2}}$ ③ $\left(\frac{a}{5}\right)^{\frac{3}{2}}$

④ $\left(\frac{a}{2}\right)^{\frac{1}{3}}$ ⑤ $\left(\frac{a}{2}\right)^{\frac{1}{2}}$

해설

$a = 5 \times 729^x = 5 \times (3^6)^x = 5 \times 3^{6x}$

$\frac{a}{5} = 3^{6x} = (3^{3x})^2$

$\therefore\ 3^{3x} = \left(\frac{a}{5}\right)^{\frac{1}{2}}$

$\therefore\ 27^x = 3^{3x} = \left(\frac{a}{5}\right)^{\frac{1}{2}}$

5. $\log_3 2 = a$일 때, $\log_{\sqrt{12}} 9$를 a로 나타내면?

① $\dfrac{2}{2a+1}$ ② $\dfrac{4}{2a+1}$ ③ $\dfrac{2}{a+1}$
④ $\dfrac{2}{a+2}$ ⑤ $\dfrac{4}{a+2}$

해설

$\log_{\sqrt{12}} 9$

$= \dfrac{\log_3 9}{\log_3 \sqrt{12}} = \dfrac{2}{\frac{1}{2}\log_3(2^2 \cdot 3)}$

$= \dfrac{4}{2(\log_3 2 + 1)} = \dfrac{4}{2(a+1)} = \dfrac{2}{a+1}$

6. $x^{\frac{1}{2}} + x^{-\frac{1}{2}} = 3$ 일 때, $x^2 + x^{-2}$ 의 값을 구하면?

① 33　　② 36　　③ 43　　④ 47　　⑤ 49

해설

$(x^{\frac{1}{2}} + x^{-\frac{1}{2}})^2 = 9$

$x + x^{-1} + 2 = 9$

$\therefore x + x^{-1} = 7$

$(x + x^{-1})^2 = 49$

$x^2 + x^{-2} + 2 = 49$

$\therefore x^2 + x^{-2} = 47$

7. $\log_{10} 2 = 0.301$ 일 때,

$\dfrac{10(\log_{10} 0.8 - \log_{10} 32 + \log_{10} 8)}{\log_{10} 0.7 + \log_{10} 7 - \log_{10} 49}$ 의 값은?

① 3.01 ② 6.02 ③ 6.99 ④ 9.03 ⑤ 10

해설

$$\frac{10(\log_{10} 0.8 - \log_{10} 32 + \log_{10} 8)}{\log_{10} 0.7 + \log_{10} 7 - \log_{10} 49}$$

$$= \frac{10(\log_{10} \frac{8}{10} - \log_{10} 32 + \log_{10} 8)}{\log_{10} \frac{7}{10} + \log_{10} 7 - \log_{10} 49}$$

$$= \frac{10 \log_{10}(\frac{8}{10} \times \frac{1}{32} \times 8)}{\log_{10}(\frac{7}{10} \times 7 \times \frac{1}{49})}$$

$$= \frac{10 \log_{10} \frac{2}{10}}{\log_{10} \frac{1}{10}} = \frac{10(\log_{10} 2 - 1)}{\log_{10} 10^{-1}}$$

$$= \frac{10(0.301 - 1)}{-1} = 6.99$$

8. $\log_{x-3}(-x^2+6x-8)$ 이 정의되기 위한 실수 x의 값의 범위를 구하면?

① $3 < x < 4$　② $5 < x < 7$　③ $-1 < x < 3$

④ $x > 0$　⑤ $2 < x < 5$

해설

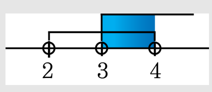
$x-3 \neq 1,\ x-3 > 0,$

$-x^2+6x-8 > 0$이므로

$x \neq 4,\ x > 3$

$x^2-6x+8 < 0$

$2 < x < 4$



$\therefore 3 < x < 4$

9. $5^{\log_5 2+3\log_5 3-\log_5 6}$ 의 값은?

① 1　② 3　③ 5　④ 7　⑤ 9

해설

$5^{\log_5 2+3\log_5 3-\log_5 6}$

$= 5^{\log_5 2+\log_5 3^3-\log_5 6}$

$= 5^{\log_5 \frac{2\times 3^3}{6}} = 5^{\log_5 3^2} = 9$

10. 다음 상용로그표를 이용하여 $\log \sqrt[3]{0.123}$ 의 소수 부분을 구하여라.

수	0	1	2	3	4	5	6	7	8	9
1.0	.0000	.0043	.0086	.0128	.0170	.0212	.0253	.0294	.0334	.0374
1.1	.0414	.0453	.0492	.0531	.0569	.0607	.0645	.0682	.0719	.0755
1.2	.0792	.0828	.0864	.0899	.0934	.0969	.1004	.1038	.1072	.1106
1.3	.1139	.1173	.1206	.1239	.1271	.1303	.1335	.1367	.1399	.1430
1.4	.1461	.1492	.1523	.1553	.1584	.1614	.1644	.1673	.1703	.1732

▶ 답 :

▷ 정답 : 0.6966

해설

상용로그표에서 $\log 1.23 = 0.0899$ 이므로

$$\log \sqrt[3]{0.123} = \frac{1}{3}\log 0.123 = \frac{1}{3}\log 1.23 \times 10^{-1}$$
$$= \frac{1}{3}(\log 1.23 - 1) = \frac{1}{3}(0.0899 - 1)$$
$$= -0.3034 = -1 + 0.6966$$

따라서 $\log \sqrt[3]{0.123}$ 의 소수 부분은 0.6966 이다.