

第4章 2. 「対数」 第5回

解答

1. (1) 2 (2) 3 (3) -3 (4) -3 (5) 0 (6) $\frac{1}{2}$
2. (1) 9 (2) -2 (3) 2 (4) 3 (5) $\frac{1}{2}$ (6) $2\log_3 5$
- (7) $\log_5 6$ (8) 2
3. (1) $\frac{1}{5}$ (2) $\frac{1}{3}$
4. (1) 6 (2) $\frac{6}{5}$

解説

1. (1) $\log_5 25 = m \iff 5^m = 25 = 5^2$ より $m = 2$
 (2) $\log_{10} 1000 = m \iff 10^m = 1000 = 10^3$ より $m = 3$
 (3) $\log_7 \frac{1}{343} = m \iff 7^m = \frac{1}{343} = 7^{-3}$ より $m = -3$
 (4) $\log_2 0.125 = m \iff 2^m = 0.125 = \frac{1}{8} = 2^{-3}$ より $m = -3$
 (5) $\log_7 1 = m \iff 7^m = 1 = 7^0$ より $m = 0$
 (6) $\log_2 \sqrt[4]{4} = m \iff 2^m = \sqrt[4]{4} = \sqrt[4]{2^2} = 2^{\frac{2}{4}} = 2^{\frac{1}{2}}$ より $m = \frac{1}{2}$
2. (1) 与式 = $\log_2 2^9 = 9\log_2 2 = 9 \times 1 = 9$
 (2) 与式 = $\log_{10} 10^{-2} = -2\log_{10} 10 = -2 \times 1 = -2$
 (3) 与式 = $\log_8 (4 \times 16) = \log_8 64 = \log_8 8^2 = 2\log_8 8 = 2$
 (4) 与式 = $\log_3 \left(\frac{81}{2} \times \frac{2}{3} \right) = \log_3 27 = \log_3 3^3 = 3\log_3 3 = 3 \times 1 = 3$
 (5) 与式 = $\log_2 \left(\sqrt{10} \times \frac{1}{\sqrt{5}} \right) = \log_2 \sqrt{2} = \log_2 2^{\frac{1}{2}} = \frac{1}{2} \log_2 2 = \frac{1}{2} \times 1 = \frac{1}{2}$
 (6) 与式 = $\log_3 \left(\frac{100}{3} \times \frac{3}{4} \right) = \log_3 25 = \log_3 5^2 = 2\log_3 5$
 (7) 与式 = $\log_5 \sqrt{3} + \log_5 2\sqrt{3} = \log_5 (\sqrt{3} \times 2\sqrt{3}) = \log_5 6$
 (8) 与式 = $\log_2 5^{\frac{1}{3}} - \log_2 \frac{5^{\frac{1}{3}}}{4} = \log_2 \left(5^{\frac{1}{3}} \times \frac{4}{5^{\frac{1}{3}}} \right) = \log_2 4 = \log_2 2^2 = 2\log_2 2 = 2$
3. (1) 与式 = $\frac{1}{\log_2 32} = \frac{1}{\log_2 2^5} = \frac{1}{5\log_2 2} = \frac{1}{5}$
 (2) 与式 = $\frac{1}{\log_5 125} = \frac{1}{\log_5 5^3} = \frac{1}{3\log_5 5} = \frac{1}{3}$
4. (1) 底を2に変換して, 与式 = $\frac{\log_2 25}{\log_2 2} \times \frac{\log_2 8}{\log_2 5} = \log_2 5^2 \times \frac{\log_2 2^3}{\log_2 5} = 2\log_2 5 \times \frac{3\log_2 2}{\log_2 5} = 6$
 (2) 底を2に変換して, 与式 = $\frac{\log_2 27}{\log_2 32} \times \frac{\log_2 16}{\log_2 9} = \frac{\log_2 3^3}{\log_2 2^5} \times \frac{\log_2 2^4}{\log_2 3^2} = \frac{3\log_2 3}{5\log_2 2} \times \frac{4\log_2 2}{2\log_2 3} = \frac{3\log_2 3}{5} \times \frac{4}{2\log_2 3} = \frac{6}{5}$