第 9 回　解答 (工科系数学 I 及び演習)

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1. 次を x^r の形に直しなさい.

$\dfrac{1}{x^5} = x^{-5}$

$\sqrt{x} = x^{\frac{1}{2}}$

$\sqrt[3]{x} = x^{\frac{1}{3}}$

$\sqrt[5]{x^2} = x^{\frac{2}{5}}$

$\dfrac{1}{\sqrt{x^3}} = x^{-\frac{3}{2}}$

2. 次を簡単にしなさい.

$2^5 5^5 = (2 \cdot 5)^5 = 10^5 = 100000$

$7^{30} 7^{-28} = 7^{30-28} = 7^2 = 49$

$\left((729)^{\frac{1}{3}} \right)^3 = (729)^{\frac{1}{3} \cdot 3} = 729^1 = 729$

$a^2 + a^4 = a^2(1 + a^2)$

$x^3 x^4 = x^7$

$(a^2)^3 = a^6$

$(ab)^2 = a^2 b^2$

$(2xy)^3 = 2^3 x^3 y^3 = 8x^3 y^3$

$\dfrac{x^2}{x^6} = x^2 \cdot x^{-6} = x^{-4}$

$2a^{\frac{1}{2}} \cdot 3a^2 = 6a^{\frac{1}{2}} \cdot a^2 = 6a^{\frac{1}{2}+2} = 6a^{\frac{5}{2}}$

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

$(3x^{\frac{1}{2}} y)^2 = 3^2 \cdot x^{\frac{1}{2} \cdot 2} y^2 = 9x^1 y^2 = 9xy^2$

3. 次を簡単にしなさい.

$\log_3 3 = 1$

$\log_3 1 = 0$

$\log_3 \dfrac{1}{3} = -1$

$\log_2 8 = 3$

$\log_3 \dfrac{1}{81} = -4$

$\log_6 2 + \log_6 3 = \log_6 2 \cdot 3 = \log_6 6 = 1$

$\log_3 45 - \log_3 5 = \log_3 \dfrac{45}{5} = \log_3 9 = 2$

$\log_{10} 3 - \log_{10} 300 = \log_{10} \dfrac{3}{300} = \log_{10} \dfrac{1}{100} = -2$

$\log_5 50 - \log_5 6 + \log_5 15 = \log_5 \dfrac{50 \cdot 15}{6} = \log_5 5^3 = 3$

$\log_4 \dfrac{1}{16} = -2$

$\log_3 \sqrt{27} = \log_3 27^{\frac{1}{2}} = \dfrac{1}{2} \log_3 27 = \dfrac{3}{2}$

$\log_2 9 \cdot \log_3 8 = \dfrac{\log_2 9 \cdot \log_2 8}{\log_2 3} = \log_3 9 \log_2 8 = 2 \cdot 3 = 6$

4. 次を $\log_2 x, \log_2 y$ を用いて表しなさい.

$\log_2 x^2 y = 2 \log_2 x + \log_2 y$

$\log_2 \dfrac{x}{\sqrt{y}} = \log_2 x - \dfrac{1}{2} \log_2 y$

$\log_2 \sqrt[3]{x^2} = \dfrac{2}{3} \log_2 x$

$\log_4 x = \dfrac{1}{2} \log_2 x$

5. 次の方程式を解きなさい.

(1)　$3^x = 81$

$x = \log_3 81 = 4$

(2)　$\log_5 2x = -1$

$2x = 5^{-1}$ $\therefore x = \dfrac{1}{10}$