Exponents and Logarithms

(1) Simplify the following expressions,

$$\left(64^{\frac{4}{3}}\right)^{-\frac{1}{2}} \qquad (16 \cdot 81)^{-\frac{1}{4}} \qquad \left(\frac{3^{\frac{1}{2}}}{2^{\frac{1}{3}}}\right)^4 \qquad \sqrt[3]{108} - \sqrt[3]{32}$$

(2) Simplify the following expression,

$$(3ab^2c)\left(\frac{2a^2b}{c^3}\right)^{-2}$$

(3) Simplify the following expression,

$$\left(\frac{x^{-3}}{y^{-2}}\right)^2 \left(\frac{y}{x}\right)^4$$

(4) Simplify the following expression,

$$\sqrt[3]{x^{-2}} \cdot \sqrt{4x^5}$$

(5) Evaluate the following expression,

$$\left(\frac{7^{-5} \cdot 7^2}{7^{-2}}\right)^{-1}$$

(6) Evaluate the following expression,

$$\sqrt[3]{\frac{-8}{27}}$$

(7) Use the Change of Base Formula and the calculator to evaluate $\log_7 24$ and $\log_3 59049$.

(8) Rewrite the expression as a single logarithm,

$$\ln(a+b) + \ln(a-b) - 2\ln c$$

(9) Analyze the expression so there is no longer a logarithm of a product, quotient, root, or power:

$$\log\left(\frac{a^2}{b^4\sqrt{c}}\right)$$

(10) Solve the equation.

$$4^{1-2x} = 2$$

(11) Solve the equation.

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

(12) Solve the equation.

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

(13) Solve the equation.

$$\log_x 64 = -3$$

(14) Solve the equation.

$$5^x = 3^{x+2}$$

(15) Solve the equation.

$$\log_3 \sqrt{x-2} = 2$$

(16) Solve the equation.

$$2^{x+1} \cdot 8^{-x} = 4$$

(17) Solve the equation.

$$\log_6(x+3) + \log_6(x+4) = 1$$

(18) Solve the equation.

$$e^{1-x} = 5$$

(19) Solve the equation.

$$2^{3x} = 3^{2x+1}$$

(20) Solve the equation.

$$e^{2x} - e^x - 6 = 0$$