

REVIEW OF LOGARITHMS AND EXPONENTS

1. Express the following in equivalent form, lowest terms and without negative exponents.

$$\frac{(x^{-3}y^5z^6)^{-2}(x^4y^{-3}z^2)^4}{(x^{-1}y^{-2}z^7)^3}$$

2. Solve the following equations without using a calculator.

a. $4^{(5x-1)} = 32^{(3x+2)}$

b. $\log_5 3^x = \log_{25} 9^{(1-2x)}$

c. $\log_3 x + \log_3(x+2) = 1$

d. Solve the system:

$$\log x - \log y = 1$$

$$x + 2y = 20$$

e. If $2^{16} = 65,536$, what is $\log_2(\log_2 65,536)$?

f. $\frac{1}{2^{(y-1)}} = 32^{(\frac{3}{5})}$

g. $\log(4x-3) = 2 - \log 20$

h. $\log x = \left\{ \frac{1}{3} [2 \log 8 - 6 \log 3] - 2 \log 2 \right\} + \log 3$

3. Solve the following equations. Calculators should be used as necessary.

a. $\log_5 28.14 = x$

b. $17^{(2x-3)} = 25^{(x-1)}$

4. Given: $e^p = a$, $e^q = b$, $e^r = c$ Find (in terms of p, q, r and known numerical values) expressions for each of the following:

a. $\ln a\sqrt{b}$

b. $\ln a^5c$

c. $\ln\left(\frac{b}{c}\right)$

d. $\ln \frac{\sqrt[3]{ab}}{c^2}$

5. $g(x) = 2^{(x+3)} - 1$ On a single set of axes, draw careful graphs of $g(x)$ and $g^{-1}(x)$. Draw $g(x)$ in pencil and $g^{-1}(x)$ in red (or some other distinctive color).

6. Solve for x (any way you know how, but be aware that many of these can be done without a calculator)

a. $\log_{16} x = \frac{3}{4}$

f. If $\log_b x = y$, determine b^y and x

b. $\log_6 x - \log_6(x+1) = 2$

g. $10^{\log 1000} = x$

c. $\frac{\log 1000}{\log x} = \log \frac{1}{1000}$

h. $a^{3 \log_a 4} = x$ (answer may contain a)

d. $\log_3 7 = x$

i. $36^{\log_6 2} = x$

e. $\frac{\log 4}{\log 2} = \frac{\ln 4}{x}$

j. $e^{\ln e^2} = x$

7. Given: $\log_b 2 = p$, $\log_b 3 = q$, $\log_b 6 = r$, then determine appropriate expressions for:

a. $\log_b 12$

b. $\log_2 3$

c. What is the relationship among p, q, and r?

d. Does it matter what b is?

8. Solve for x in terms of y and then solve for y in terms of x. (State any restrictions on the variables)

$$3^x = \frac{y+1}{y-2}$$

9. Solve for x: $\log_5 8 = \log_x 7$

10. Simplify as much as possible: $a^{x^2-3x+2} \left(\frac{3}{a^2} + x^2 \right)$

ANSWERS

1. $\frac{x^{25}}{y^{16}z^{25}}$

2.

a. $-\frac{12}{5}$

b. $\frac{1}{3}$

c. 1 (reject -3)

d. $\left(\frac{50}{3}, \frac{5}{3}\right)$

e. 4

f. -2

g. 2

h. $\frac{1}{3}$

3.

a. 2.074

b. 2.158

4.

a. $p + \frac{q}{2}$

b. $5p + r$

c. $q - r$

d. $\frac{p+q}{3} - 2r$

6.

a. 8

b. ϕ (reject $-\frac{36}{35}$)

c. $\frac{1}{10}$

d. 1.77

e. $\ln 2 \quad \frac{\log 4}{\log 2} = \log_2 4 = \frac{\ln 4}{\ln 2}$

f. $b^y = x \quad x = b^y$

g. 1000

h. 64

i. 4

j. e^2

7.

a. $2p + q$ or $p + r$ or $2r - q$

b. $\frac{q}{p}$

c. $p + q = r$

$x = \frac{\log(y+1) - \log(y-2)}{\log 3} \quad y > 2$

8.

$y = \frac{2 \cdot 3^x + 1}{3^x - 1} \quad x \neq 0$

9. 4.51

10. $3a^{x^2-3x} + x^2a^{x^2-3x+2}$