

Name: _____

Logs and Exponentials

Exponential Rules:

a , b , and c are numbers, and $a > 0$:

1. $a^0 = 1$
2. $a^1 = a$
3. $a^{-b} = 1/a^b$
4. $a^b \cdot a^c = a^{b+c}$
5. $(a^b)^c = a^{bc}$

Logarithm Rules:

a , b , and c are numbers, and $a > 0$.

1. $\log_a(1) = 0$
2. $\log_a(a) = 1$
3. $\log_a(1/b) = -\log_a(b)$
4. $\log_a(b \cdot c) = \log_a(b) + \log_a(c)$
5. $\log_a(b^c) = c \log_a(b)$

1. Calculate the following numbers or simplify the expression:

(a) $(2^2)^2$

(c) $(2^{3x+2})^{3x-2}$

(e) $((4^3)^2)^1$

(b) $(3^{2+4})^2$

(d) $x^{2y} \cdot (x^3)^y$

(f) $(4x)^y$

2. Calculate the following numbers or simplify the expression:

(a) $\log_3(27)$

(c) $\log_2(4^x)$

(e) $\log_e(e^e)$

(b) $\log_3(9^2)$

(d) $\log_2(4 \cdot x^y)$

(f) $\log_e(e^0)$

3. Find the value of x that makes the expression true. Don't use a calculator.

(a) $2^x = 4^{x+2}$

(d) $2^3 = 2^{x+4}$

(b) $2^{x+4} = 3^{-x+3}$

(e) $e^x = 2^y$

(c) $2^{x+4} = \left(\frac{1}{2}\right)^{x^2-2}$

(f) $e^x = (e^2)^{x+2}$

4. How are the graphs of $f(x) = a^x$ and $g(x) = b^x$ related? The graphs of $f(x) = \log_a(x)$ and $g(x) = \log_b(x)$?