Name KEY   Algebra 2   Practice Quiz 7.1 - 7.4

1. Explain (or show) how to evaluate the logarithm without using a calculator.

a. $\log_4 16$ $4^2=16$ therefore $\log_4 16 = 2$

b. $\log_5 1$ $5^0=1$ therefore $\log_5 1 = 0$

c. $\log_3 \frac{1}{9}$ $3^{-2} = \frac{1}{3^2} = \frac{1}{9}$ therefore $\log_3 \frac{1}{9} = -2$

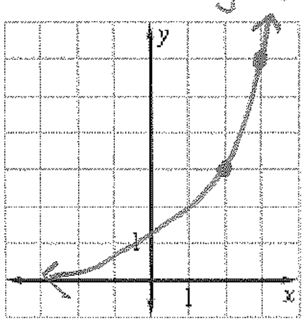
2. Rewrite the equation in exponential form. $\log_4 \frac{1}{64} = -3$

$4^{-3} = \frac{1}{64}$

3. Rewrite the equation in log form. $5^2 = 25$ $\log_5 25 = 2$

Graph the function. State the domain and range. Identify at least two points.

4. $y = 3 \cdot 2^{x-2}$ Parent: $y = 3 \cdot 2^x$ right 2

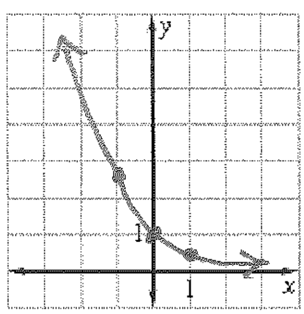


Domain: Real

Range: $y > 0$

Points: $(0,3) \to (2,3)$
$(1,6) \to (3,6)$

5. $y = \left(\frac{2}{5}\right)^x$ Parent: $y = \left(\frac{2}{5}\right)^x$

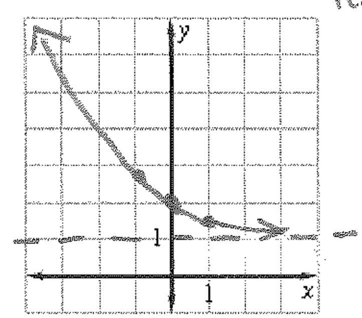


Domain: Real

Range: $y > 0$

Points: $(0,1)$
$(1, \frac{2}{5})$
$(-1, \frac{5}{2})$

6. $f(x) = \left(\frac{3}{5}\right)^x + 1$ Parent: $f(x) = \left(\frac{3}{5}\right)^x$ up 1



Domain: Real

Range: $y > 1$

Points: $(0,1) \to (0,2)$
$(1, \frac{3}{5}) \to (1, 1\frac{3}{5})$
$(-1, \frac{5}{3}) \to (-1, 2\frac{2}{3})$

Simplify the expression.

7. $3e^4 \cdot e^3$

$3e^7$

8. $(-4e^{3x})^5$

$(-4)^5 e^{15x}$

$-1024e^{15x}$

9. $\frac{e^{4x}}{5e}$

$\frac{1}{5} \cdot \frac{e^{4x}}{e^1}$

$\frac{1}{5} e^{4x-1}$

10. $\frac{8e^{5x}}{6e^{2x}}$

$\frac{8}{6} \cdot \frac{e^{5x}}{e^{2x}}$

$\frac{4}{3} e^{3x}$

11. From 1997 to 2001, the number n (in millions) of black-and-white TV's sold in the U.S. can be modeled by $n = 26.8\,(0.85)^t$ where t is the number of years since 1997.

a. Identify the decay factor: 0.85

b. Identify the percent decrease: 15% $\quad (1-0.85 = 0.15 = 15\%)$

c. Estimate the number of TV's sold in 1999: $\overset{t}{x} = 2$

$n = 26.8(0.85)^2 = 19.363$ million TV's

12. You deposit $1300 in an account that pays 4.4% annual interest. Find the balance after 6 years if... $A = P\left(1+\frac{r}{n}\right)^{nt}$

a. The interest is compounded monthly: $A = 1300\left(1+\frac{0.044}{12}\right)^{12\cdot 6} = \$1691.95$

b. The interest is compounded continuously: $A = Pe^{rt} = 1300\,e^{0.044(6)} = \$1692.77$

13. Find the inverse of the function.

a. $y = \log_4 (x - 6)$

$x = \log_4 (y-6)$

$4^x = 4^{\log_4 (y-6)}$

$4^x = y-6$

$4^x + 6 = y$

b. $y = \ln (x + 10)$

$x = \ln(y+10)$

$e^x = e^{\ln(y+10)}$

$e^x = y+10$

$e^x - 10 = y$

c. $y = 2^x - 3$

$x = 2^y - 3$

$x+3 = 2^y$

$\log_2(x+3) = \log_2 2^y$

$\log_2(x+3) = y$

14. The *apparent magnitude* of a star is a measure of the brightness of the star as it appears to observers on Earth. The apparent magnitude M of the dimmest star that can be seen with a telescope is given by the function

$$M = 5 \log D + 2$$

where D is the diameter (in millimeters) of the telescope's objective lens. If a telescope has a diameter of 100 millimeters, what is the apparent magnitude of the dimmest star that the telescope can reveal? $M = 5\log 100 + 2 = 12$