

Graphing and Analyzing Log Functions - Solutions

Approximate each number using a calculator. Round your answer to three decimal places.

1. $3^{2.9} \approx \underline{24.191}$ 2. $5^{\sqrt{7}} \approx \underline{70.681}$ 3. $e^{-0.71} \approx \underline{0.492}$

Write each equation in its equivalent exponential form:

4. $4 = \log_2 x$ $\underline{2^4 = x}$

5. $3 = \log_b 27$ $\underline{b^3 = 27}$

Write each equation in its equivalent logarithmic form:

6. $2^{-4} = \frac{1}{16}$ $\underline{\log_2 \frac{1}{16} = -4}$

7. $\sqrt[9]{9} = 3$ $\underline{\log_9 3 = \frac{1}{2}}$

Evaluate WITHOUT using a calculator:

8. $\log_4 16 = \underline{2}$

9. $\log_2 \frac{1}{8} = \underline{-3}$

10. $\log 10^{12} = \underline{12}$

11. $10^{\log 41x^2} = \underline{41x^2}$

12. $\log_9 3 = \underline{\frac{1}{2}}$

13. $\log_6 1 = \underline{0}$

14. $\log 1 = \underline{0}$

15. $\ln e^{\sqrt{x}} = \underline{\sqrt{x}}$

16. $\log_{11} 11 = \underline{1}$

17. $\log_5 \frac{1}{\sqrt{5}} = \underline{-\frac{1}{2}}$

18. $\ln e^{62} = \underline{62}$

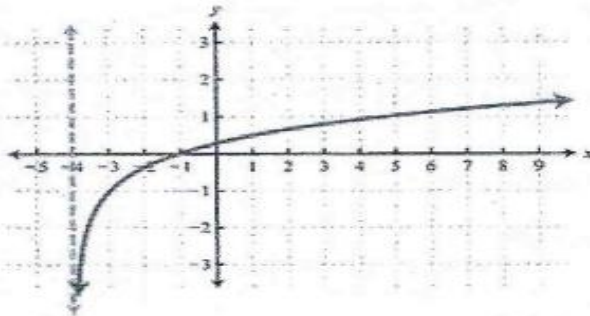
19. $e^{\ln 19x} = \underline{19x}$

20. $\log_5 5^7 = \underline{7}$

20. $6^{\log_6 17} = \underline{17}$

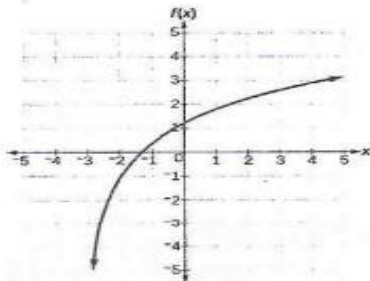
Analyzing Graphs of Logarithmic Functions

Analyzing Graphs Example



Domain: $(-4, \infty)$
 Range: $(-\infty, \infty)$
 Asymptote: $x = -4$
 x-intercept: -1
 y-intercept: $.25$
 RelMax/Min: *none: strictly increasing*
 Int Increase: $(-4, \infty)$
 Int Decrease: *none*
 Where $f(x) > 0$: $(-1, \infty)$
 Where $f(x) < 0$: $(-4, -1)$

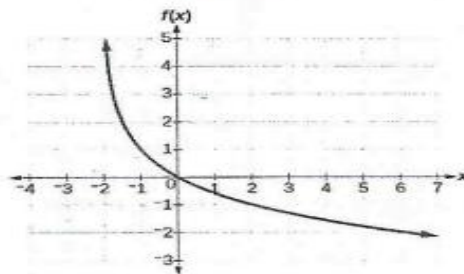
Analyzing Logarithmic Graphs #1



Domain: $(-3, \infty)$
 Range: $(-\infty, \infty)$
 Asymptote: $x = -3$
 x-intercept: ≈ -1.4
 y-intercept: ≈ 1.2
 RelMax/Min: *none*
 Int Increase: $(-3, \infty)$
 Int Decrease: *none*
 Where $f(x) > 0$: $(-1.4, \infty)$
 Where $f(x) < 0$: $(-3, -1.4)$

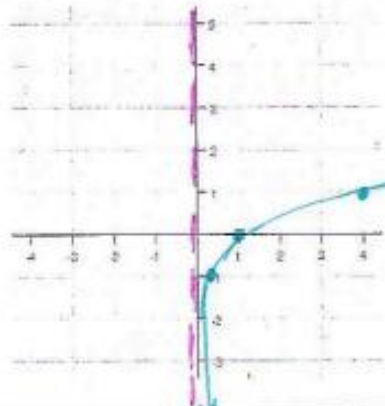
Analyzing Logarithmic Graphs #2

Domain: $(-2, \infty)$
 Range: $(-\infty, \infty)$
 Asymptote: $x = -2$
 x-intercept: 0
 y-intercept: 0
 RelMax/Min: *none*
 Int Increase: *none*
 Int Decrease: $(-2, \infty)$
 Where $f(x) > 0$: $(-2, 0)$
 Where $f(x) < 0$: $(0, \infty)$



Graphing Logarithmic Functions

Graphing Logarithmic Functions Example



$y = \log_4 x$

arg = 0
 $x = 0$

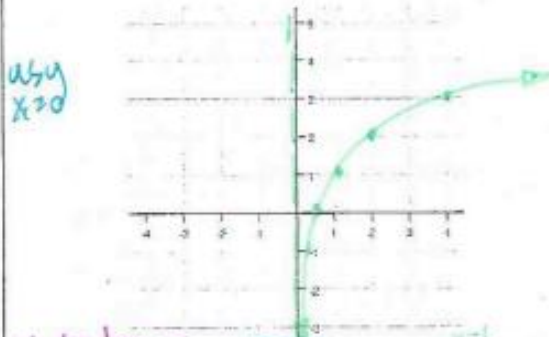
arg > 0
domain
 $x > 0$

Equivalent Exponential Equation: $4^y = x$

Equation of Vertical Asymptote: $x = 0$

x	1/16	1/8	1/4	1/2	1	2	4	16
y	-4	-3	-2	-1	0	1	2	4

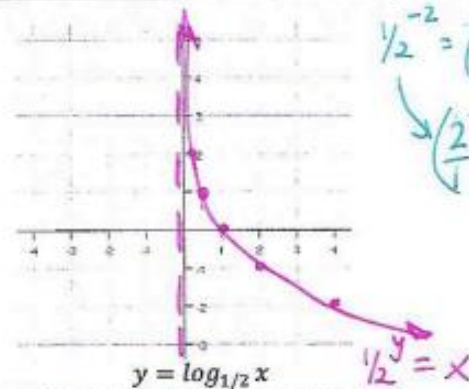
Graphing Logarithmic Functions #1



$y - 1 = \log_2 x$ $y = \log_2 x + 1$ $2^{y-1} = x$

x	1/16	1/8	1/4	1/2	1	2	4
y	-3	-2	-1	0	1	2	3

Graphing Logarithmic Functions #2



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

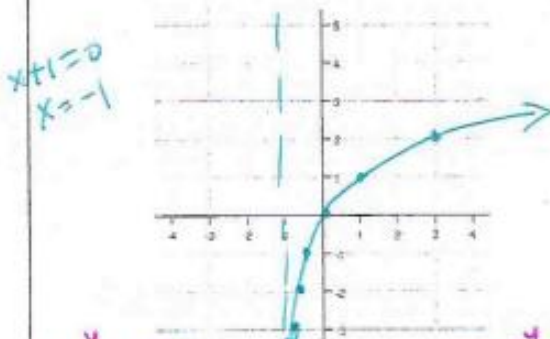
$\left(\frac{2}{1}\right)^2 = 4$

$y = \log_{1/2} x$

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

x	1/16	1/8	1/4	1/2	1	2	4
y	4	3	2	1	0	-1	-2

Graphing Logarithmic Functions #3

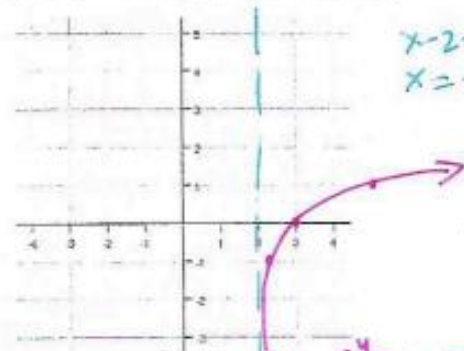


$x+1=0$
 $x=-1$

$2^y = x+1$ $y = \log_2(x+1)$ $x = 2^y - 1$

x	-15/16	-7/8	-3/4	-1/2	0	1	3	7
y	-4	-3	-2	-1	0	1	2	3

Graphing Logarithmic Functions #4



$x-2=0$
 $x=2$

$y = \log_3(x-2)$

$3^y = x-2$
 $x = 3^y + 2$

x	14	17	20	23	26	29	32	35
y	4	3	2	1	0	-1	-2	-3