

4.3 WS

KEY

Write each equation in its exponential form.

1. $2 = \log_8 64$

$8^2 = 64$

2. $2 = \log 100$

$10^2 = 100$

3. $\log_5 125 = 3$

$5^3 = 125$

4. $\ln x = 7$

$e^7 = x$

Write each equation in its logarithmic form. Assume $y > 0$ and $b > 0$.

5. $7^2 = 49$

$\log_7 49 = 2$

6. $y = e^x$

$\ln y = x$

7. $4^3 = 64$

$\log_4 64 = 3$

8. $e^5 = 3x + 1$

$\ln(3x + 1) = 5$

Evaluate each logarithmic expression. Do not use a calculator.

9. $\log_4 16$

2

10. $\log_3 3$

1

11. $\log_6 1296$

4

12. $\log_3 \frac{1}{243}$

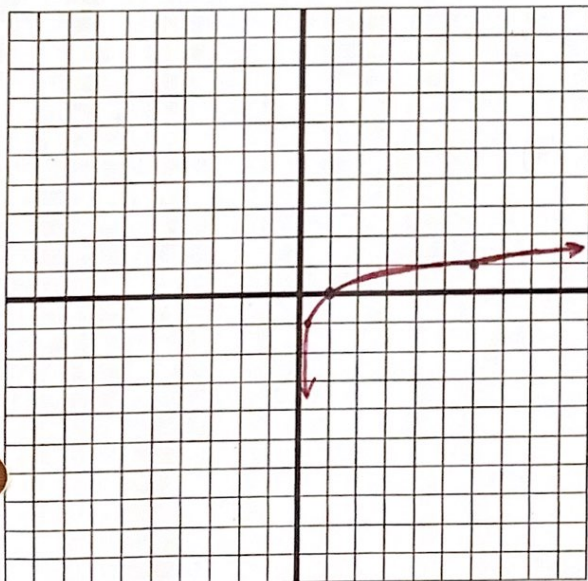
-5

Graph each function by using its exponential form.

13. $f(x) = \log_6 x$

$6^y = x$

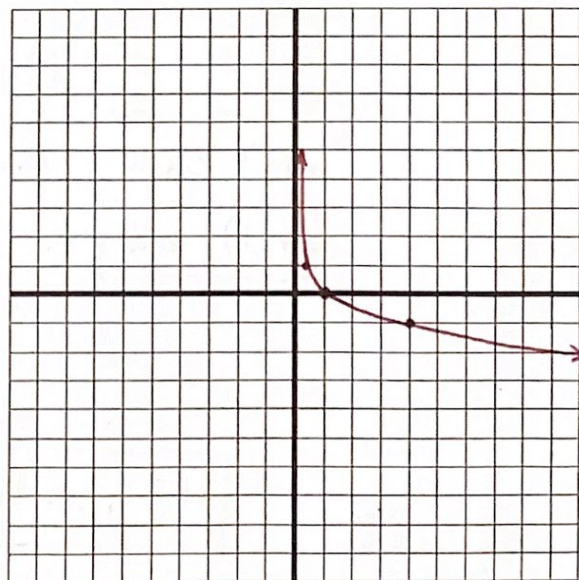
x	y
1/6	-1
1	0
6	1



14. $f(x) = \log_{1/4} x$

$(\frac{1}{4})^y = x$

x	y
4	-1
1	0
1/4	1



Find the domain of the function.

15. $k(x) = \log_{\frac{2}{3}}(11-x)$

$$\begin{aligned} 11-x &> 0 \\ -x &> -11 \\ x &< 11 \end{aligned}$$

D_x of $k(x)$: $(-\infty, 11)$

16. $f(x) = \ln(x^2 - 4)$

$$\begin{aligned} x^2 - 4 &> 0 \\ (x-2)(x+2) &> 0 \\ \text{c.v. } 2, -2 \end{aligned}$$

$x-2$	-		-		+
$x+2$	-		+		+
	+	-	2	+	

D_x of $f(x)$: $(-\infty, -2) \cup (2, \infty)$

17. $h(x) = \log_2\left(\frac{x}{x+5}\right)$

$$\begin{aligned} \frac{x}{x+5} &> 0 \\ \text{c.v. } 0, -5 \end{aligned}$$

x	-		-		+
$x+5$	-		+		+
	+	-	0	+	

D_x of $h(x)$: $(-\infty, -5) \cup (0, \infty)$

18. $g(x) = \log_7\left(\frac{x+2}{x^2}\right)$

$$\begin{aligned} \frac{x+2}{x^2} &> 0 \\ \text{c.v. } 0, -2 \end{aligned}$$

$x+2$	-		+		+
x^2	+		+		+
	-	-	0	+	

D_x of $g(x)$: $(-2, 0) \cup (0, \infty)$

Explain how to use the graph of the first function to produce the graph of the second function.

19. $f(x) = \log_4 x$; $f(x) = \log_4(x+5)$ Shift up 5

20. $f(x) = \log_8 x$; $f(x) = \log_8(x+1)$ Shift left 1

21. $f(x) = \log_{\frac{2}{3}} x$; $f(x) = \log_{\frac{2}{3}}(x-3) - 2$ Shift right 3, down 2

22. The function $r(t) = 0.69607 + 0.60781 \ln t$ gives the annual interest rate r , as a percent, a bank will pay on its money market accounts, where t is the term (the time the money is invested) in months.

a. What interest rate, to the nearest tenth of percent, will the bank pay on a money market account with a term of 9 months?

$$r(t) = 0.69607 + 0.60781 \ln(9)$$

$r(t) = 2\%$

b. What is the minimum number of complete months during which a person must invest to receive an interest rate of at least 3%?

45 months