

4.3 WS 2

KEY

Write each equation in its exponential form.

1. $3 = \log_4 64$

$4^3 = 64$

2. $\log_{12} 144 = 2$

$12^2 = 144$

3. $3 = \log 1000$

$10^3 = 1000$

4. $\ln x = 5$

$e^5 = x$

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

5. $14^2 = 196$

$\log_{14} 196 = 2$

6. $7^3 = 343$

$\log_7 343 = 3$

7. $20.09 = e^3$

$\ln 20.09 = 3$

8. $e^7 = x + 3$

$\ln(x + 3) = 7$

Evaluate each logarithmic expression. Do not use a calculator.

9. $\log_4 1$

0

10. $3 \log_{\frac{1}{2}} 32$

$3 \log_{\frac{1}{2}} (2^5)$
 $3 \log_{\frac{1}{2}} (\frac{1}{2})^{-5}$
-15

11. $2(5^{\log_5 125})$

250

12. $\log_{12} 1728$

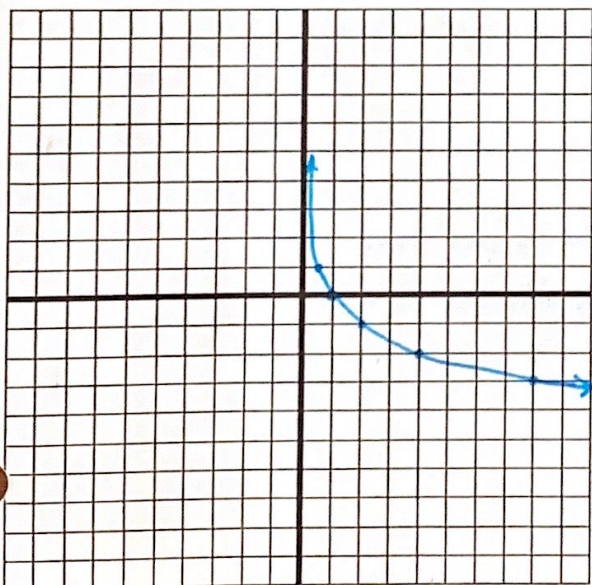
3

Graph each function by using its exponential form.

13. $f(x) = \log_{\frac{1}{2}} x$

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

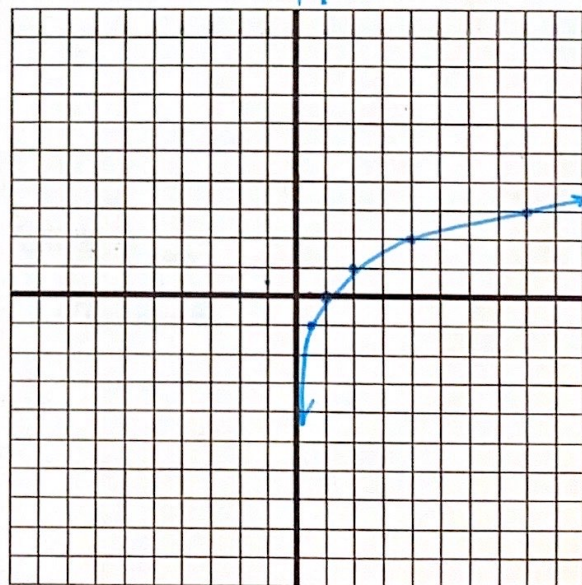
x	y
4	-2
2	-1
1	0
$\frac{1}{2}$	1



14. $f(x) = \log_2 x$

$2^y = x$

x	y
$\frac{1}{2}$	-1
1	0
2	1
4	2



Find the domain of the function.

15. $k(x) = \log_7(x+7)$

$$x+7 > 0$$

$$x > -7$$

$$D_x \text{ of } k(x): (-7, \infty)$$

16. $f(x) = \log(x^2 + 3x - 10)$

$$x^2 + 3x - 10 > 0$$

$$(x+5)(x-2) > 0$$

c.v. 2, -5

$x+5$	-		+		+
$x-2$	-		-		+
	+	-	+	-	+

$$D_x \text{ of } f(x): (-\infty, -5) \cup (2, \infty)$$

17. $h(x) = \log_2 x$

$$x > 0$$

$$D_x \text{ of } h(x): (0, \infty)$$

18. $g(x) = \log_7\left(\frac{2}{x-3}\right)$

$$\frac{2}{x-3} > 0$$

c.v. 3

2	+		+
$x-3$	-		+
	-	+	+

$$D_x \text{ of } g(x): (3, \infty)$$

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

19. $f(x) = \log_4 x$; $f(x) = \log_4(x-3) - 3$ Shift 3 right, 3 down

20. $f(x) = \log_8 x$; $f(x) = \log_8 x + 9$ Shift up 9

21. $f(x) = \log_{2/3} x$; $f(x) = \log_{2/3}(x+7)$ Shift 7 left

22. The following function models the average typing speed S , in words per minute, of a student who has been typing for t months.

$$S(t) = 5 + 29 \ln(t+1), \quad 0 \leq t \leq 16$$

- a. What was the student's average typing speed, to the nearest word per minute, when the student first started to type? What was the student's average typing speed, to the nearest word per minute, after 3 months?

Start Speed = 5 words per min.

3 months = 45 words per min.

- b. Determine how long, to the nearest tenth of a month, it will take the student to achieve an average typing speed of 65 words per minute.

7 months