

# 4.3 WS 3

KEY

Write each equation in its exponential form.

1.  $\frac{1}{2} = \log_{25} 5$

$25^{1/2} = 5$

2.  $\log 10 = 1$

$10 = 10$

3.  $3 = \log_3 \frac{27}{8}$

$(\frac{3}{2})^3 = \frac{27}{8}$

4.  $\log_7 (x-2) = 3$

$7^3 = x-2$

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

5.  $e^2 = 7.389$

$\ln 7.389 = 2$

6.  $16^{1/2} = 4$

$\frac{1}{2} = \log_{16} 4$

7.  $5^3 = 125$

$3 = \log_5 125$

8.  $x^2 + 3 = e^4$

$\ln (x^2 + 3) = 4$

Evaluate each logarithmic expression. Do not use a calculator.

9.  $\log_8 512$

3

10.  $\log_{13} 1$

0

11.  $-6 \log_{1/4} 64$

$-6(-3)$

18

12.  $7(6^{\log_6 81})$

$7(81)$

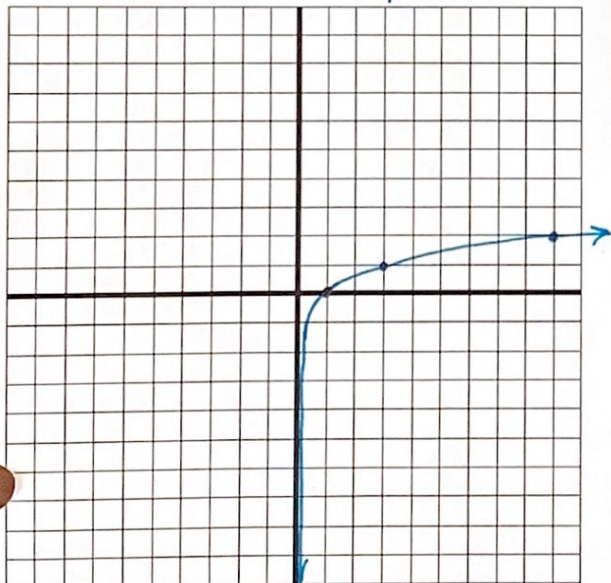
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Graph each function by using its exponential form.

13.  $f(x) = \log_3 x$

$3^y = x$

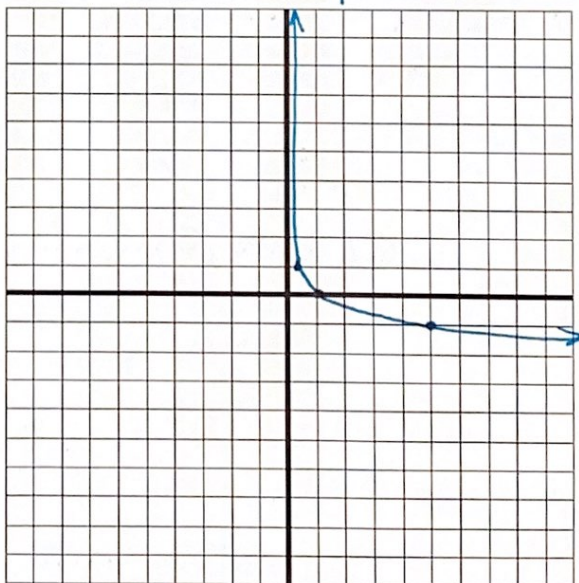
x	y
1	0
3	1
9	2



14.  $f(x) = \log_{1/5} x$

$(\frac{1}{5})^y = x$

x	y
1	0
5	-1



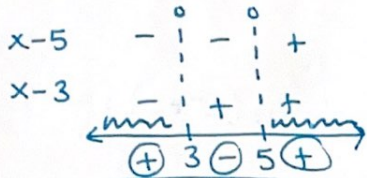
Find the domain of the function.

15.  $k(x) = \log_{15}(x^2 - 8x + 15)$

$$x^2 - 8x + 15 > 0$$

$$\begin{matrix} & -5 & -3 \\ & \wedge & \\ (x-5)(x-3) & & > 0 \end{matrix}$$

c.v.  $x = 5, 3$



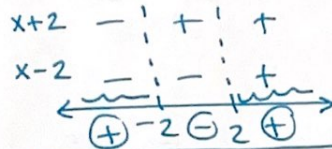
$D_x$  of  $k(x)$ :  $(-\infty, 3) \cup (5, \infty)$

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

$$x^2 - 4 > 0$$

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

c.v.  $x = \pm 2$



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

17.  $h(x) = \log_2(x-2)$

$$x-2 > 0$$

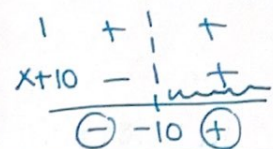
$$x > 2$$

$D_x$  of  $h(x)$ :  $(2, \infty)$   
or  
 $\{x \mid x > 2\}$

18.  $g(x) = \log_7\left(\frac{1}{x+10}\right)$

$$\frac{1}{x+10} > 0$$

c.v.  $x = -10$



$D_x$  of  $g(x)$ :  $(-10, \infty)$

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.  $f(x) = \log_8 x$ ;  $f(x) = \log_8(x-1) - 4$  Shift Right 1 & down 4.

21.  $f(x) = \log_{2/3} x$ ;  $f(x) = \log_{2/3}(x+6)$  Shift left 6.

22. The function  $N(x) = 2750 + 180 \ln\left(\frac{x}{1000} + 1\right)$  models the relationship between the dollar amount  $x$  spent on advertising a product and the number of units  $N$  that a company can sell.

a. Find the number of units that will be sold with advertising expenditures of \$20,000, \$40,000, and \$60,000.

3298 units, 3418 units, 3490 units

b. How many units will be sold if the company does not pay to advertise the product?

2750 units