

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

1. The domain of a logarithmic function  $f(x) = \log_a x$  is \_\_\_\_\_.2. The graph of every logarithmic function  $f(x) = \log_a x$ , where  $a > 0$ , and  $a \neq 1$ , passes through three points:

\_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

3. **True or False:** If  $y = \log_a x$ , then  $y = a^x$ .4. **True or False:** The graph of  $f(x) = \log_a x$ , where  $a > 0$ , and  $a \neq 1$ , has an x-intercept equal to 1 and no y-intercept.**Change each exponential statement into an equivalent statement involving a logarithm.**

5.  $9 = 3^2$

6.  $3^{(-3)} = \frac{1}{27}$

7.  $3^x = 4.6$

8.  $e^{2.2} = M$

**Change each logarithmic statement to an equivalent statement involving an exponent.**

9.  $\log_2 8 = 3$

10.  $\log_8 4 = \frac{2}{3}$

11.  $\log_2 6 = x$

12.  $\ln x = 4$

**Find the exact value of each logarithm without using a calculator. Show your work!**

13.  $\log_2 1 = x$

14.  $\log_4 16 = x$

15.  $\log_2 8 = x$

16.  $\ln \sqrt{e} = x$

Use a calculator to evaluate each expression. Do not round until the end of the problem. Round your final answer to the nearest ten-thousandths.

17.  $\log 9.43$

18.  $\log(-14)$

19.  $\ln 4.05$

20.  $\ln(-0.49)$

21.  $\frac{\ln 5}{3}$

Find the domain of each function. Write the answers in interval notation. **SHOW WORK!**

22.  $f(x) = \ln(x - 3)$

23.  $f(x) = 3 - 2\log_4 \left[ \frac{x}{2} - 5 \right]$

24.  $g(x) = \log_5 \left( \frac{2}{3}x + 8 \right)$

25.  $g(x) = \ln(-x - 2)$

Use the given function  $f$  to:

(a) Find the domain of  $f$  and any asymptotes of  $f$ . (b) Write the transformations. (c) Graph  $f$ . (d) From the graph determine the range.

Use transformations and a table of values for at least 3 key points to get the graphs. **No graphing calculators!**

26.  $f(x) = \ln(x+4)$

Domain: \_\_\_\_\_

Asymptotes: \_\_\_\_\_

Key points and transformations:

$x$	$f(x)$

$x$	$f(x)$

Range: \_\_\_\_\_

27.  $f(x) = \log(-x) + 3$

Domain: \_\_\_\_\_

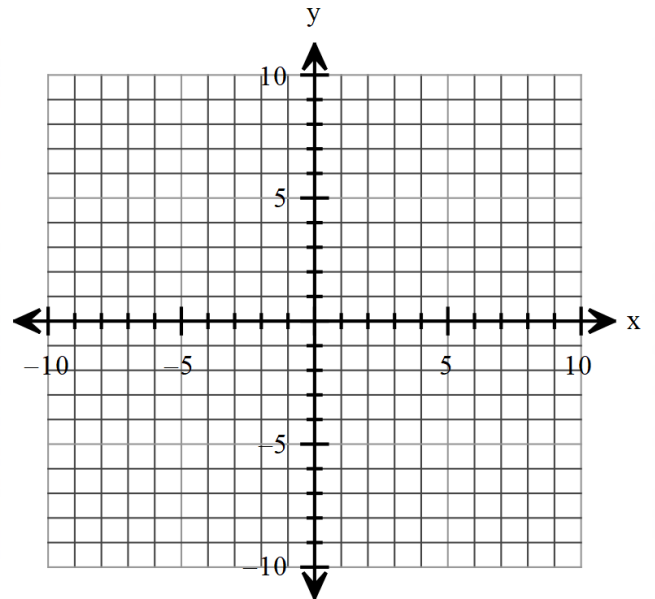
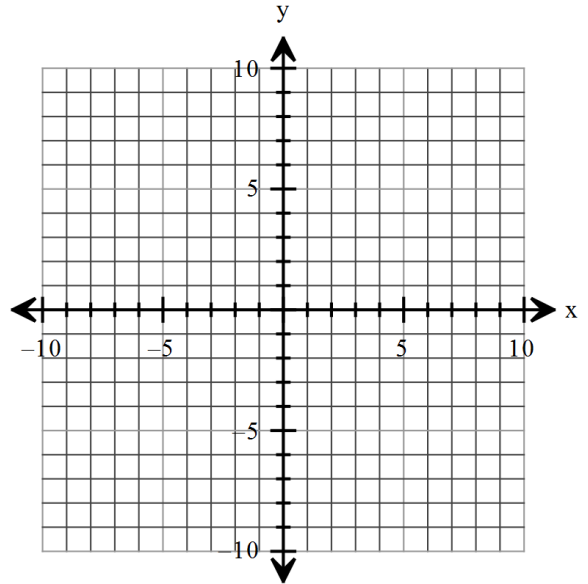
Asymptotes: \_\_\_\_\_

Key points and transformations:

$x$	$f(x)$

$x$	$f(x)$

Range: \_\_\_\_\_



28.  $f(x) = \ln[-(x+2)]$

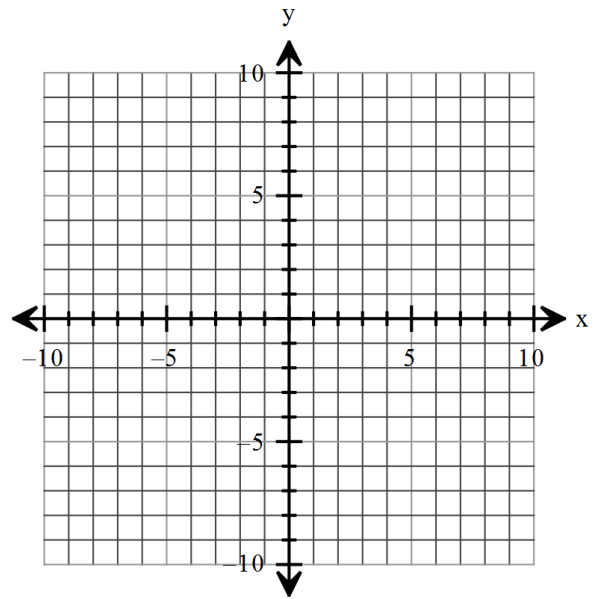
Domain: \_\_\_\_\_

Asymptotes: \_\_\_\_\_

Key points and transformations:

$x$	$f(x)$

$x$	$f(x)$



Range: \_\_\_\_\_

29.  $f(x) = -\ln(x)$

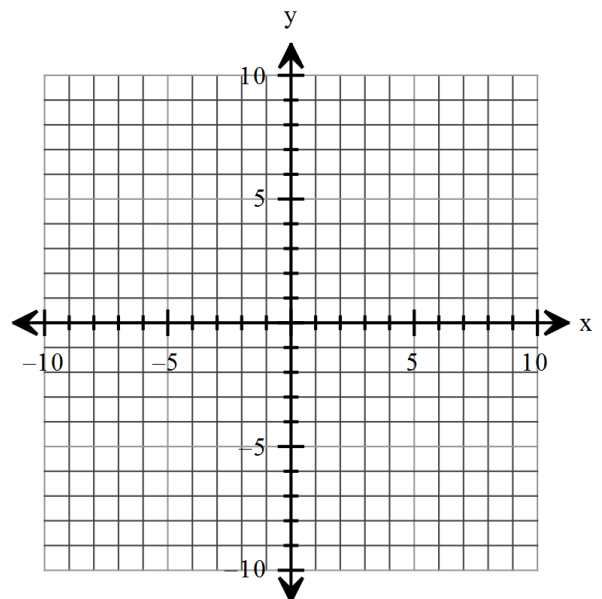
Domain: \_\_\_\_\_

Asymptotes: \_\_\_\_\_

Key points and transformations:

$x$	$f(x)$

$x$	$f(x)$



Range: \_\_\_\_\_

30.  $f(x) = -2\log_3(x-5)$

Domain: \_\_\_\_\_

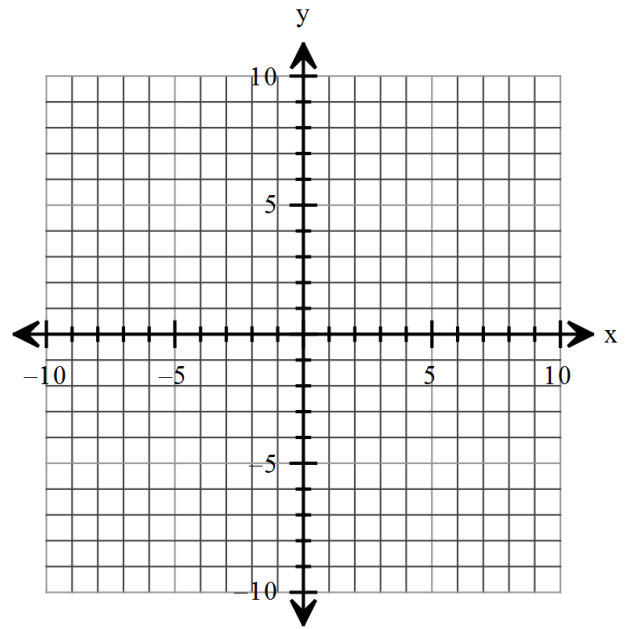
Asymptotes: \_\_\_\_\_

Key points and transformations:

$x$	$f(x)$

$x$	$f(x)$

Range: \_\_\_\_\_



31.  $f(x) = \log_3(x-4) + 2$

Domain: \_\_\_\_\_

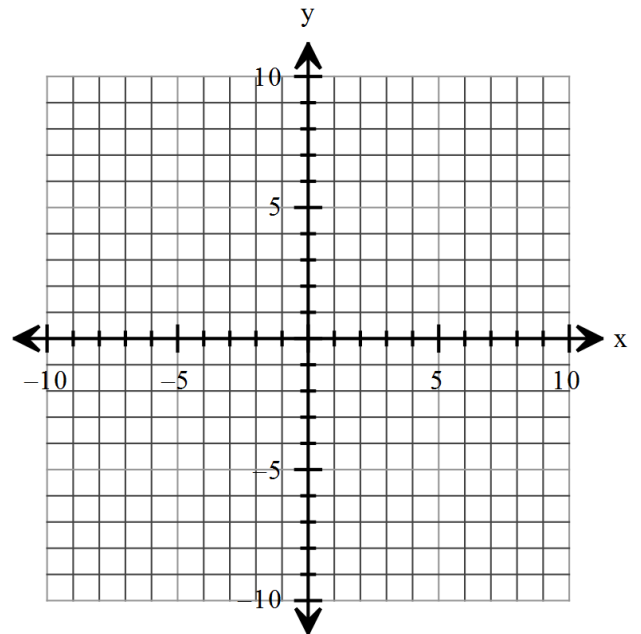
Asymptotes: \_\_\_\_\_

Key points and transformations:

$x$	$f(x)$

$x$	$f(x)$

Range: \_\_\_\_\_



32.  $f(x) = 3\log_2(-x)$

Domain: \_\_\_\_\_

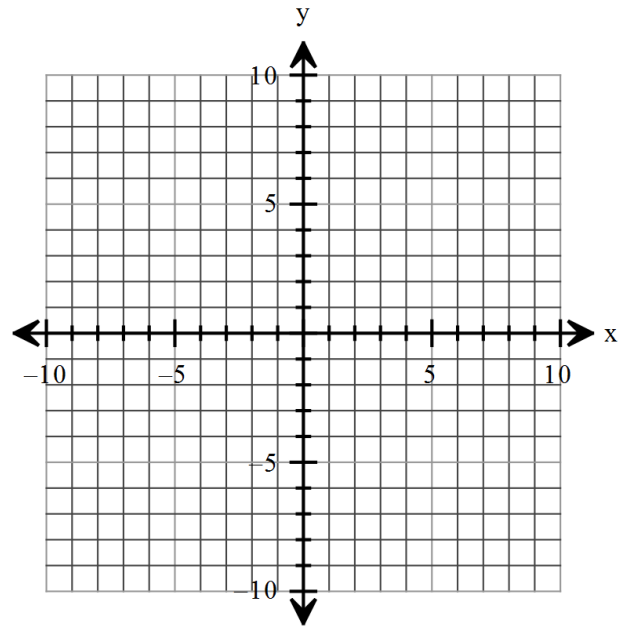
Asymptotes: \_\_\_\_\_

Key points and transformations:

$x$	$f(x)$

$x$	$f(x)$

Range: \_\_\_\_\_



33. "Loudness" is measured in decibels. The formula for the loudness of a sound is given by  $dB = 10 \log(I \div I_0)$  where  $I_0$  is the intensity of "threshold sound", or sound that can barely be perceived. Other sounds are defined in terms of how many times more intense they are than threshold sound.

a) If a cat's purr is 316 times as intense as threshold sound or  $I = 316 I_0$ , find the decibel rating.

b) Prolonged exposure to sounds above 85 decibels can cause hearing damage or loss. If a gunshot from a .22 rimfire rifle has an intensity,  $I$ , of about  $(2.5 \times 10^{13})I_0$ , should you wear ear protection when firing the rifle?

34. Earthquake intensity is measured by the Richter scale. The formula for the Richter rating of a given earthquake is given by  $R = \log(I \div I_0)$  where  $I_0$  is the threshold quake, or movement that can barely be detected, and the intensity,  $I$ , is given in terms of multiples of that threshold intensity. The seismograph says you have an event that had an intensity,  $I$ , of  $989 I_0$ . A heavy truck can cause a microquake with a Richter rating of 3 or 3.5. A moderate quake has a Richter rating of 4 or more. Was the event more likely made from a heavy truck or a quake?