

9.4

Name _____ Date _____ Period Key

1. The domain of a logarithmic function $f(x) = \log_a x$ is $(0, \infty)$ 1pt.

2. The graph of every logarithmic function $f(x) = \log_a x$, where $a > 0$, and $a \neq 1$, passes through three points: $(\frac{1}{a}, -1)$, $(1, 0)$, and $(a, 1)$. 3pt

1pt 3. True or **False** If $y = \log_a x$, then $y = a^x$.

1pt 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.

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

1pt 5. $f(x) = \ln(x-3)$

$x-3 > 0$
 $x > 3$

$(3, \infty)$

1pt 6. $f(x) = 3 - 2\log_4 \left[\frac{x}{2} - 5 \right]$

$\frac{x}{2} - 5 > 0$
 $2 \cdot \frac{x}{2} > 5 \cdot 2$
 $x > 10$

$(10, \infty)$

1pt 7. $g(x) = \log_5(2x+8)$

$2x+8 > 0$
 $2x > -8$
 $x > -4$

$(-4, \infty)$

1pt 8. $g(x) = \ln(-x-2)$

$-x-2 > 0$
 $+2 +2$
 $\frac{-x}{-1} > \frac{2}{-1}$
 $x < -2$

$(-\infty, -2)$

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!

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

Domain: $(-4, \infty)$

Asymptotes: $x = -4$

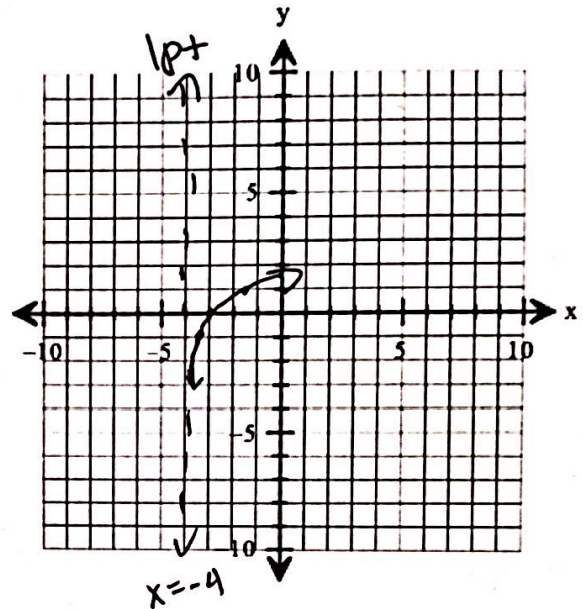
Key points and transformations:

Domain
 $x+4 > 0$
 $-4 < x$
 $x > -4$

transformations
 Left 4

x	f(x)
$\frac{1}{e} - 4$	-1
1 - 4	0
e - 4	1

x	f(x)
-3.6	-1
-3	0
-1.3	1



Range: $(-\infty, \infty)$

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

Domain: $(-\infty, 0)$

Asymptotes: $x = 0$

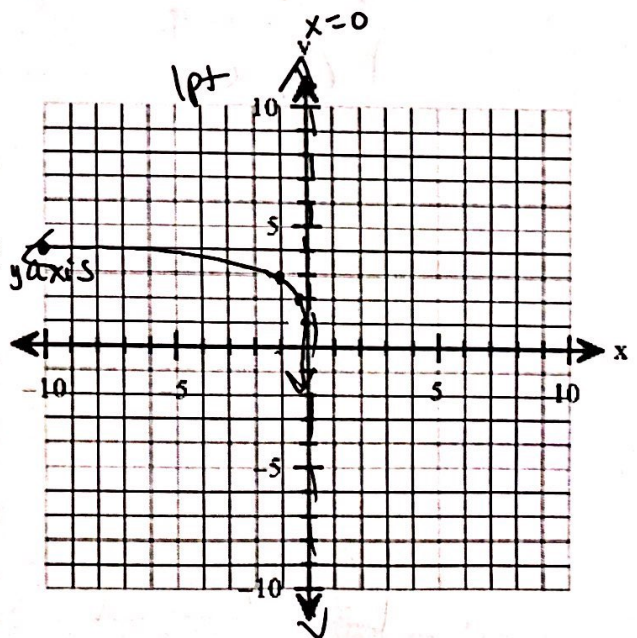
Key points and transformations:

Domain
 $-x > 0$
 $x < 0$

transformations
 ① reflect over y-axis
 ② up 3

x	f(x)
$\frac{1}{10} - 1$	-1 + 3
1 - 1	0 + 3
10 - 1	1 + 3

x	f(x)
$-\frac{1}{10}$	2
-1	3
-10	4



Range: $(-\infty, \infty)$

1) From the

other page.

$(-\infty, \infty)$

11. $f(x) = \ln[-(x+2)]$
 $a \rightarrow e$

Domain: $(0, -2)$

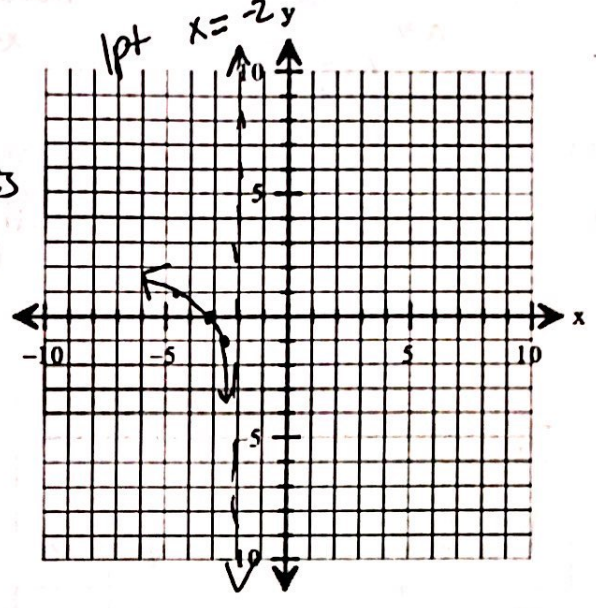
Asymptotes: $x = -2$

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

Key points and transformations:
 ① reflect over y axis
 ② left 2

x	f(x)
$\frac{1}{e}$	-1
1	0
e	1

x	f(x)
-2.4	-1
-3	0
-4.7	1



Range: $(-\infty, \infty)$

12. $f(x) = -\ln(x)$
 $a \rightarrow e$

Domain: $(0, \infty)$

Asymptotes: $x = 0$

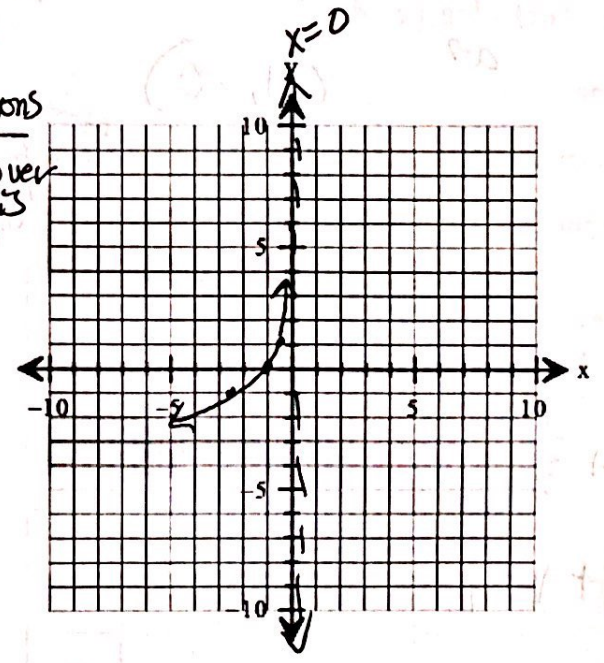
Domain
 $x > 0$

transformations
 ① Reflect over x axis

Key points and transformations:

x	f(x)
$\frac{1}{e}$	-1
1	0
e	1

x	f(x)
.4	1
1	0
2.7	-1



Range: $(-\infty, \infty)$

6pt

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

Domain: $(5, \infty)$

Asymptotes: $x = 5$

Domain

$x - 5 > 0$
 $x > 5$

Transformations

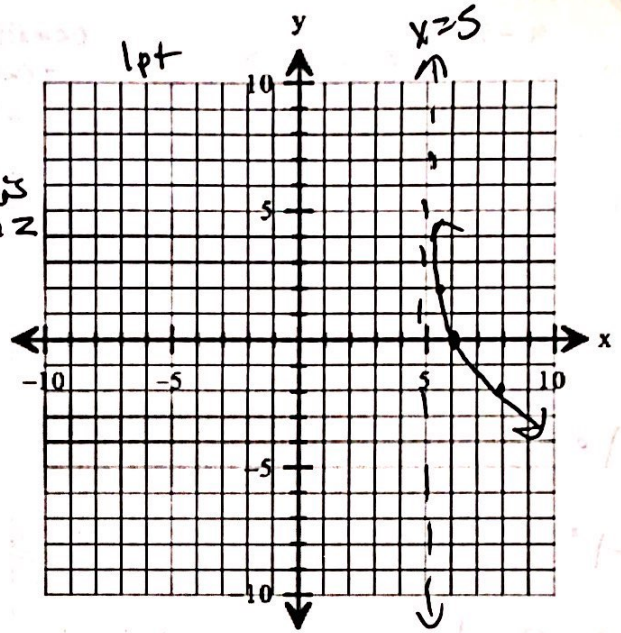
- ① Reflect over x axis
- ② Vertical stretch 2
- ③ Right 5

Key points and transformations:

x	f(x)
$\frac{1}{3}$	-1
1	0
3	1

1pt

x	f(x)
$5\frac{1}{3}$	2
6	0
8	-2



1pt

Range: $(-\infty, \infty)$

6pt

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

Domain: $(4, \infty)$

Asymptotes: $x = 4$

Domain

$x - 4 > 0$
 $x > 4$

Transformations

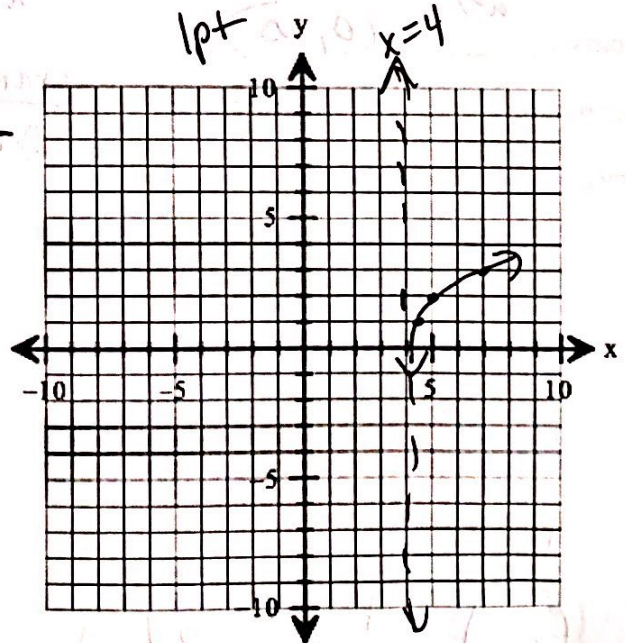
- ① Right 4
- ② up 2

Key points and transformations:

x	f(x)
$4 + \frac{1}{3}$	-1 + 2
$4 + 1$	0 + 2
$4 + 3$	1 + 2

1pt

x	f(x)
$4\frac{1}{3}$	1
5	2
7	3



Range: $(-\infty, \infty)$

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

Domain: $(-\infty, 0)$

$-x > 0$
 $x < 0$

Asymptotes: $x = 0$

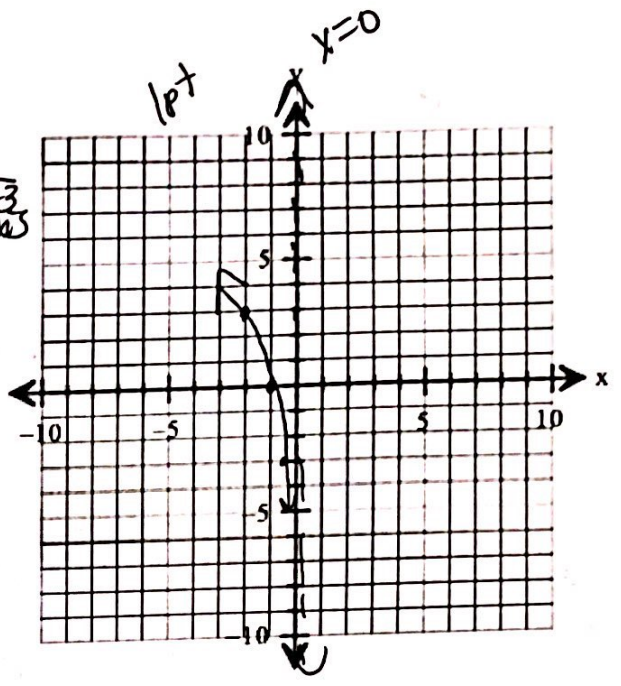
Transformations

Key points and transformations:

- ① Vertical stretch of 3
- ② Reflect over y-axis

x	f(x)
$-\frac{1}{2}$	-3
-1	0
-2	3

x	f(x)
$-\frac{1}{2}$	-3
-1	0
-2	3



Range: $(-\infty, \infty)$

16. $f(x) = -4^{(x+2)}$

Domain: $(-\infty, \infty)$

Asymptotes: $y = 0$
* horizontal line

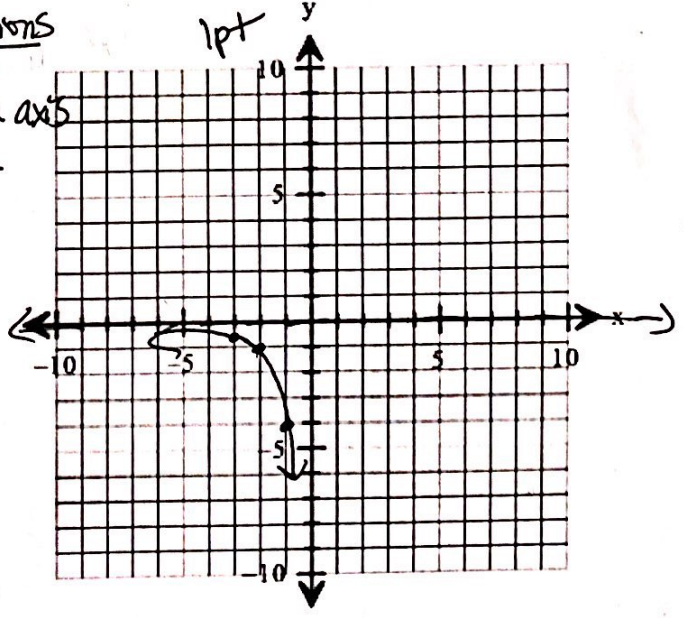
Key points and transformations:

Transformations

- ① Reflect over x-axis
- ② left 2

x	f(x)
-1	$\frac{1}{4}$
0	1
1	4

x	f(x)
-3	$-\frac{1}{4}$
-2	-1
-1	-4



Range: $(-\infty, \infty)$