

5-4 Graphing Logarithmic Functions

Objectives:

5-4a: I can graph a logarithmic equations using transformations and points.

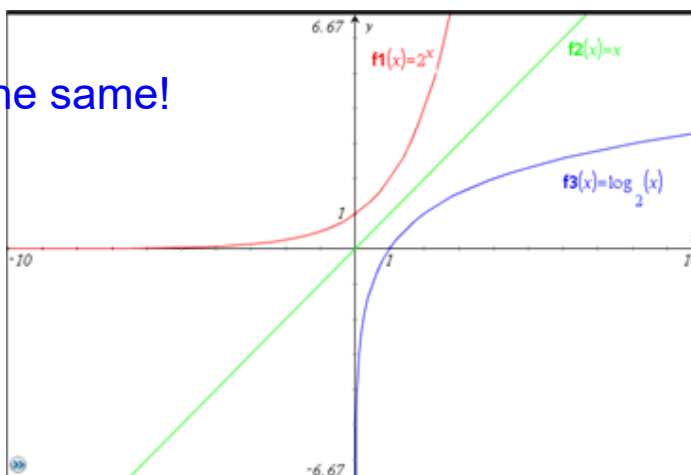
5-4b: I can identify the asymptote of a logarithmic function.

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Logarithms & Exponentials

$$f(x) = 2^x \quad \blacksquare \quad f(x) = \log_2 x$$

Notice the bases are the same!



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Describe the transformations on each graph:

$$f(x) = \log(x + 2)$$

$$f(x) = 3\log(x) - 4$$

$$f(x) = -2\ln(x - 5)$$

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Graphing Transformed Logarithmic Functions

When graphing a transformed function, it is helpful to consider the following features of the graph: the vertical asymptote, and two reference points (1,0) and (b,1).

Function	$f(x) = \log_b x$	$g(x) = a \log_b (x - h) + k$
Asymptote	$x = 0$	$x = h$
Reference point	(1, 0)	(1 + h, k)
Reference point	(b, 1)	(b + h, a + k)

1) Move asymptote from $x = 0$

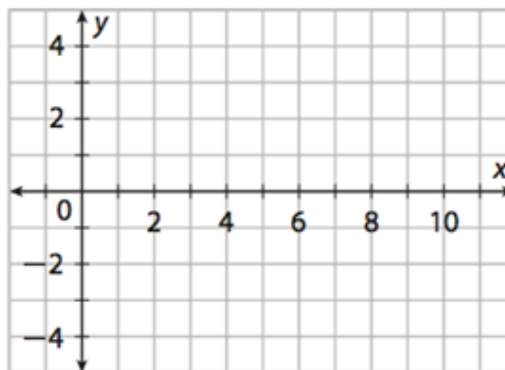
2) Move ref. pt. from (1,0)

3) Move ref. pt. from (b,1)

4) Draw graph

List the transformations, then graph.

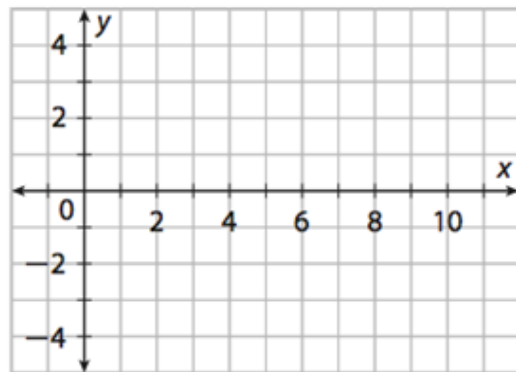
$$g(x) = 2 \log (x + 2) + 4$$



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Graph the logarithmic function.

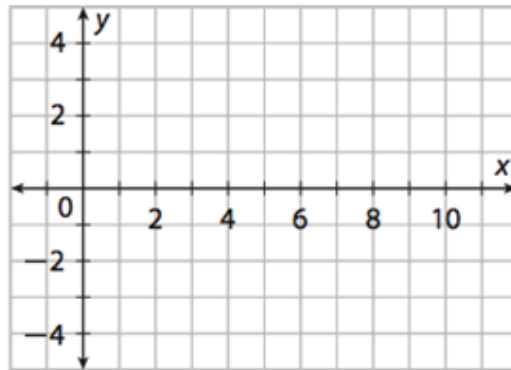
$$f(x) = \log_5(x + 2) - 1$$



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Graph the logarithmic function.

$$f(x) = 2\log_3 x - 3$$



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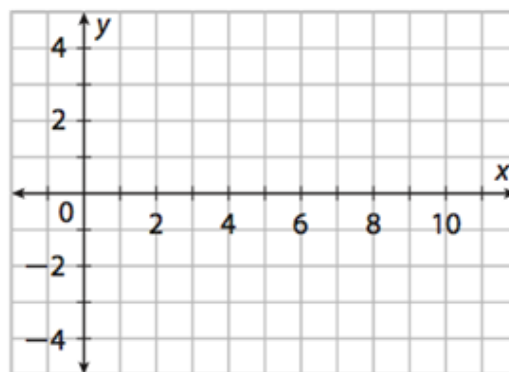
Graph and analyze the following functions:

$$f(x) = 2 \cdot \log(x - 1)$$

Domain:

Range:

End behavior:



Vertical Asymptote:

Increasing:

Decreasing:

Intercepts:

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$$f(x) = \log_2(x+1) - 3$$

Domain:

Range:

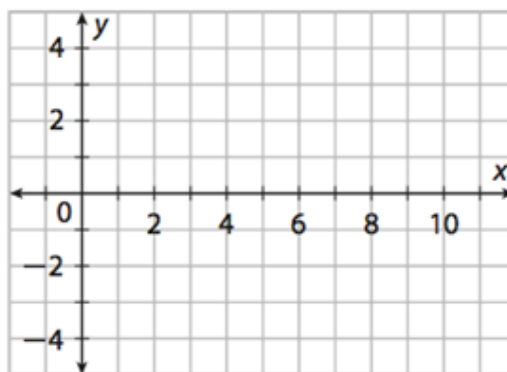
End behavior:

Vertical Asymptote:

Increasing:

Decreasing:

Intercepts:



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$$f(x) = 3 \cdot \ln(x) + 2$$

Domain:

Range:

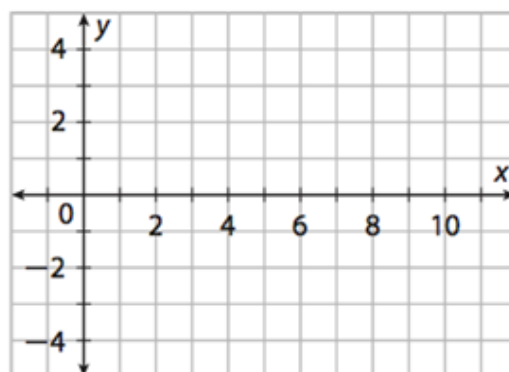
End behavior:

Vertical Asymptote:

Increasing:

Decreasing:

Intercepts:



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