2.11 Logarithmic Functions

Exponential Graph

Logarithmic Graph

$b > 0$

x-intercept:

y-intercept:
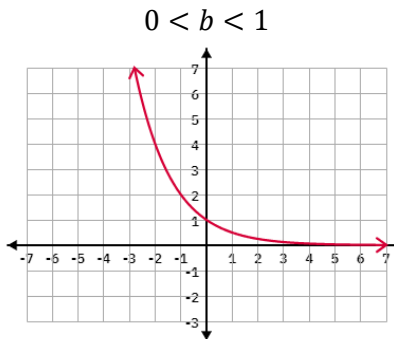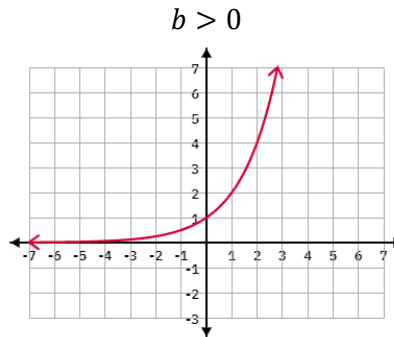
asymptote:

increasing:

decreasing:

domain:

range:

x-intercept:

y-intercept:

asymptote:

increasing:

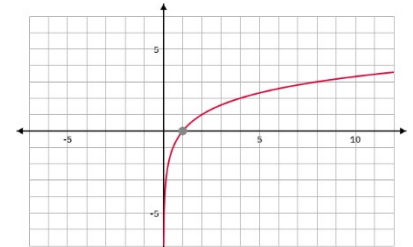decreasing:

domain:

range:
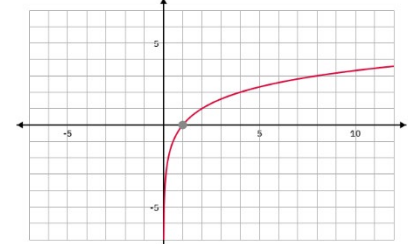

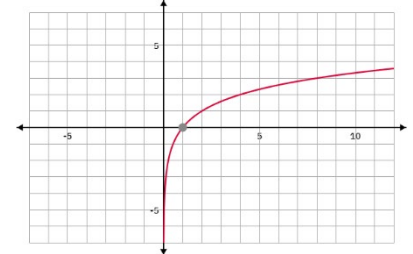
$0 < b < 1$

Transformations of Logarithm Graphs

Horizontal/Vertical Translations

Horizontal/Vertical Dilations

Horizontal/Vertical Reflections

Which transformations affect the domain/range?

Find the domain/range, asymptotes and end behavior of the following functions. (Sketch a graph to help)

a. $f(x) = \ln(4 - x) + 2$

b. $f(x) = -2\log_3(x - 2)$

USE A CALCULATOR

c. $f(x) = \log(x - 5)^2$
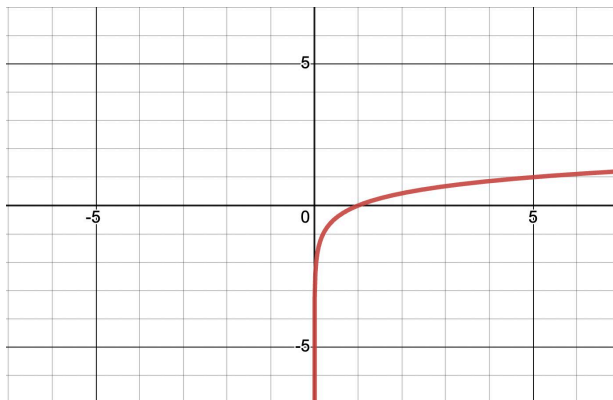
2.11 Logarithmic Functions

AP Precalculus

2.11 Practice

Sketch a graph of the transformation of $f(x) = \log_5 x$ onto the graph. Label each graph.

1. $g(x) = 3\log_5(x + 2) - 4$

2. $h(x) = 3\log_5(3 - x) + 1$

3. $j(x) = -\log_5(x - 3) - 2$

Find all relevant information from the given function. Sketch a graph. No calculator.

4. $f(x) = \ln(x - 3) + 5$

Asymptote:

Domain: Range:

End Behavior:

Graph:

5. $f(x) = -2\log_2(x + 3) - 6$

Asymptote:

Domain: Range:

End Behavior:

Graph:

6. $f(x) = \log_6(8 - x) + 1.5$

   Asymptote:

   Domain: Range:

   End Behavior:

   Graph:

7. $f(x) = -\log(2x - 5)$

   Asymptote:

   Domain: Range:

   End Behavior:

   Graph:

8. $f(x) = 455 \log_9(x + 376) + 543$

   Asymptote:

   Domain: Range:

   End Behavior:

   Graph:

9. $f(x) = -3 \ln(10 - x)$

   Asymptote:

   Domain: Range:

   End Behavior:

   Graph:

Write a logarithmic function with the given information.

10. End Behavior
$$x \to \infty, f(x) \to \infty$$
$$x \to -6^+, f(x) \to -\infty$$

11. Domain
$$(-\infty, 8)$$

CALCULATOR ACTIVE: Find all relevant information.

12. $f(x) = \log(|x + 4|) - 10$

   Asymptote:

   Domain: Range:

   End Behavior:

13. $f(x) = -3 \ln\left(\frac{x+7}{x}\right)$
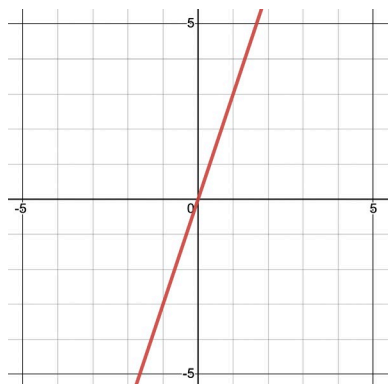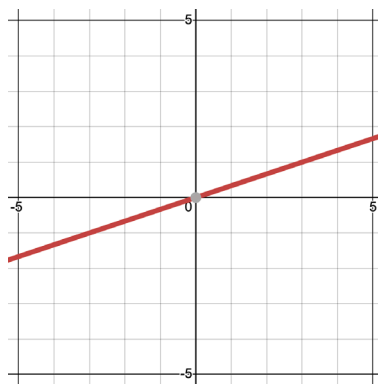
   Asymptote:

   Domain: Range:

   End Behavior:

14. The function h has the relationship that when the input is tripled the output values will increase by 1. Which of the following graphs could be $h(x)$?
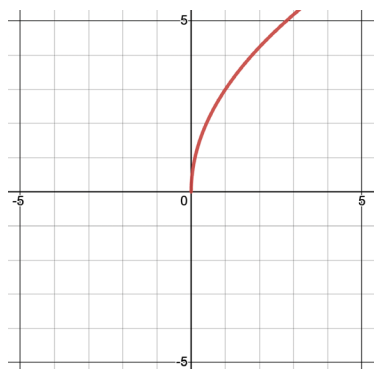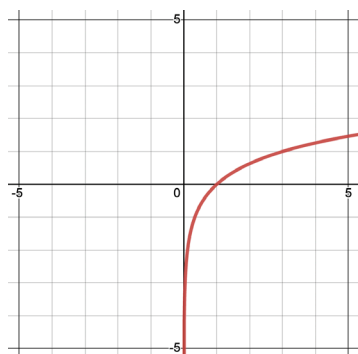
(A)

(B)

(C)

(D)

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15. Which of the functions could have the following conditions?

$$x \to 10^-, f(x) \to \infty$$
$$x \to -\infty, f(x) \to -\infty$$

(A) $f(x) = -3\ln(x - 10) + 5$

(B) $g(x) = -2\log(5 - x) + 10$

(C) $h(x) = -\log_3(10 - x) - 5$

(D) $j(x) = \log(10 - x) + 4$

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16. **Calculator active.** If $\log_{0.2}(x + 2) < \log_{0.04}(x + 2)$, then x lies in which of the following intervals?

(A) $(-\infty, -1)$

(B) $(-2, -1)$

(C) $(-1, \infty)$

(D) $(1, 2)$