Logarithmic Functions

A. Write each exponential equation as a corresponding logarithmic equation.

    1. $3^2 = 9$ **2.** $5^4 = 625$

    3. $4^{-3} = \frac{1}{64}$ **4.** $10^{-5} = \frac{1}{100,000}$

    5. $\left(\frac{1}{2}\right)^5 = \frac{1}{32}$ **6.** $\left(\frac{1}{11}\right)^{-2} = 121$

B. Write each logarithmic equation as a corresponding exponential equation.

    1. $\log_7\left(\frac{1}{49}\right) = -2$ **2.** $\log_{\frac{1}{3}}\left(\frac{1}{729}\right) = 6$
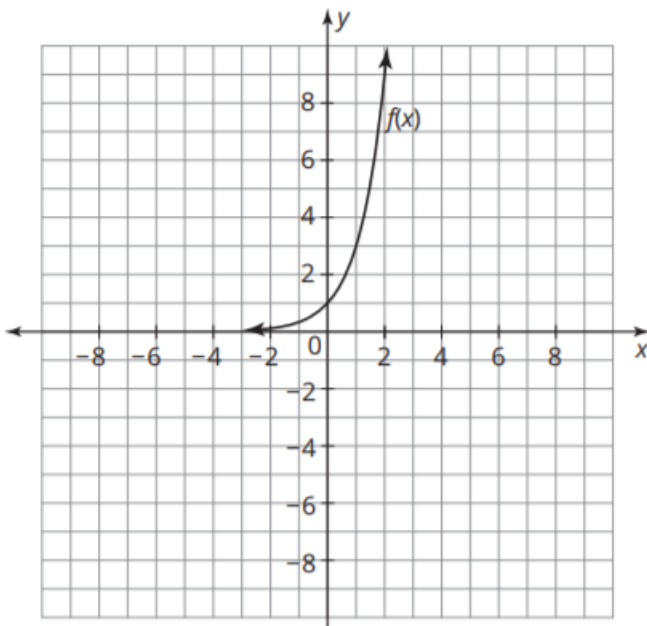
    3. $\log_2(128) = 7$ **4.** $\log_6\left(\frac{1}{1296}\right) = -4$

    5. $\log_{\frac{1}{5}}\left(\frac{1}{125}\right) = 3$ **6.** $\log_9(729) = 3$

C. Graph the inverse of each exponential function $f(x)$. Then, describe the domain, range, asymptotes, and end behavior of the inverse.
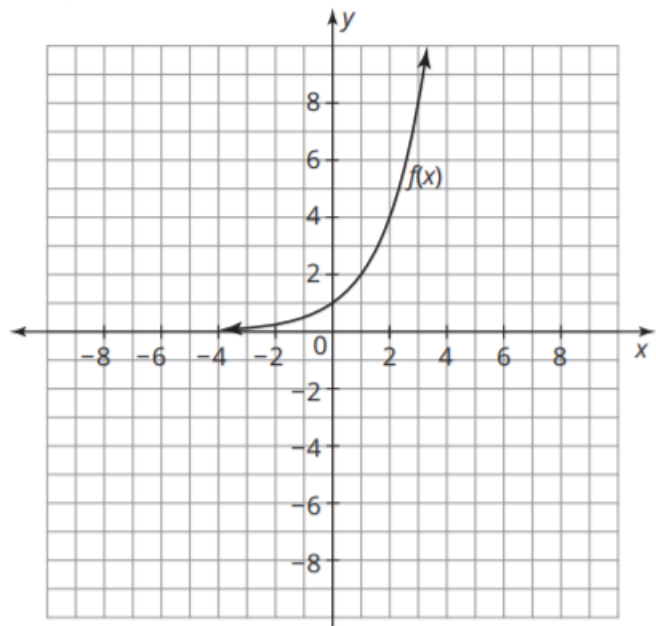
    1. $f(x) = 3^x$ **2.** $f(x) = 2^x$

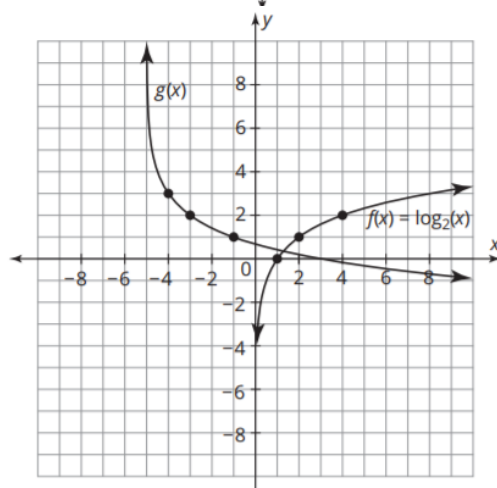

        Domain: Domain:

        Range :   Range :

        Asymptotes: Asymptotes:

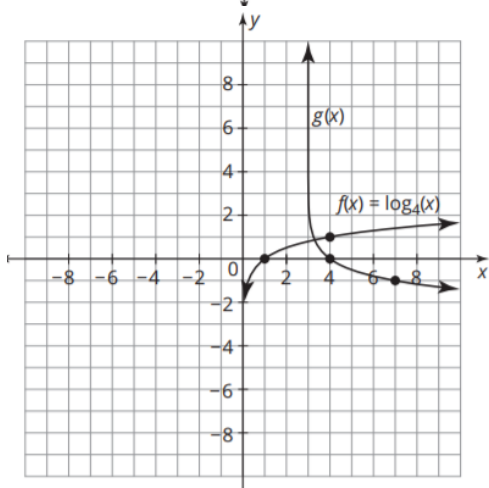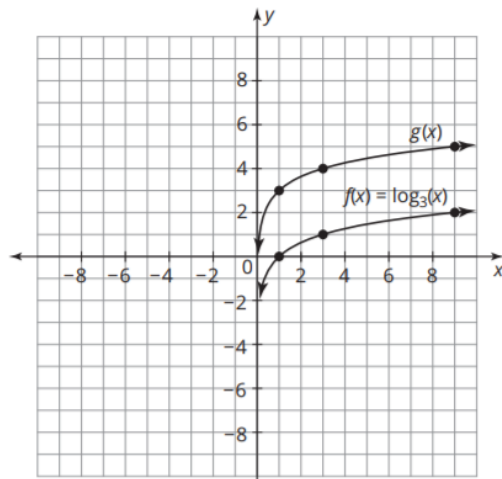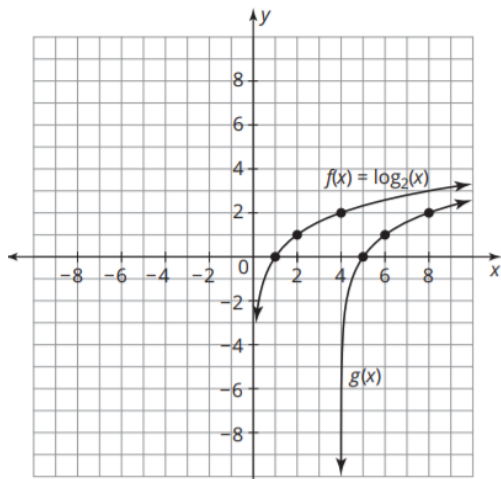   End behavior: End behavior:

IV. Transformations of Logarithmic Functions

A. Analyze the graphs of $f(x)$ and $g(x)$. Describe the transformations performed on the graph of $f(x)$ to produce the graph of the transformed function $g(x)$. Then, write an equation for $g(x)$.

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

$g(x)$

$g(x)$

$f(x) = \log_{53}(x)$

$g(x)$

$f(x) = \log_4(x)$

$g(x)$

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

B. The graph of $f(x) = \log(x)$ is shown. Use the graph of $f(x)$ to sketch the transformed function $m(x)$ on the coordinate plane. Then, state the domain, range, and asymptotes of $m(x)$.

$m(x) = f(x - 4)$

Domain of $m(x)$:

Range of $m(x)$:

Asymptotes of $m(x)$:

$m(x) = f(x + 1) - 3$

Domain of $m(x)$:

Range of $m(x)$:

Asymptotes of $m(x)$:

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

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