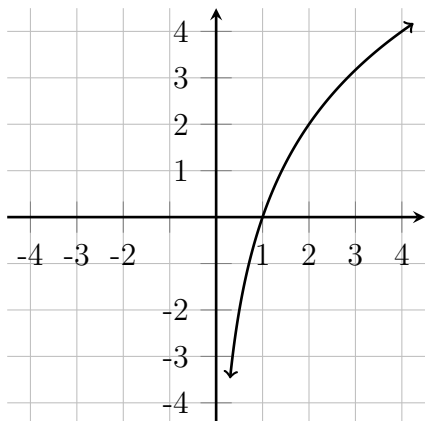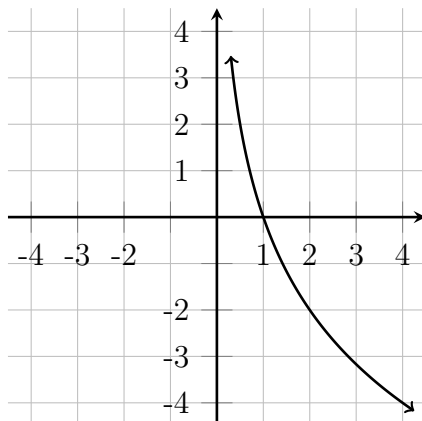**Purpose:** In this problem set, you will improve your understanding of logarithmic functions by studying their graphical properties.
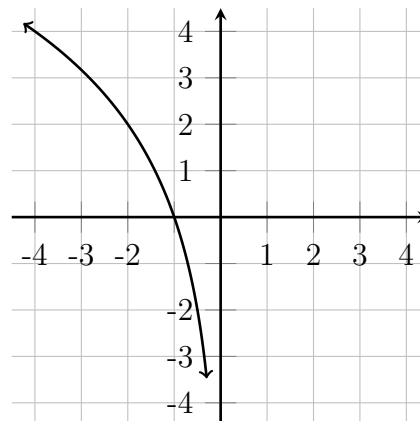
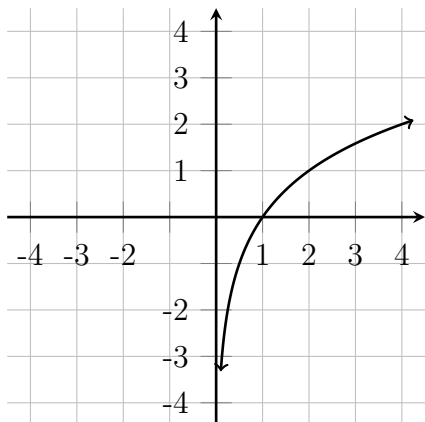1. Let's get warmed up with some matching.
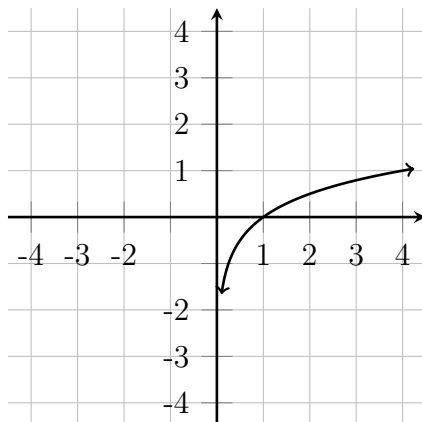

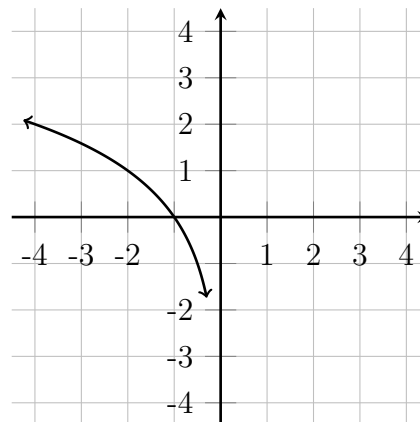_____ $f(x) = \log_2(x)$ _____ $f(x) = 2\log_2(x)$

_____ $f(x) = \dfrac{1}{2}\log_2(x)$ _____ $f(x) = 2\log_2(-x)$

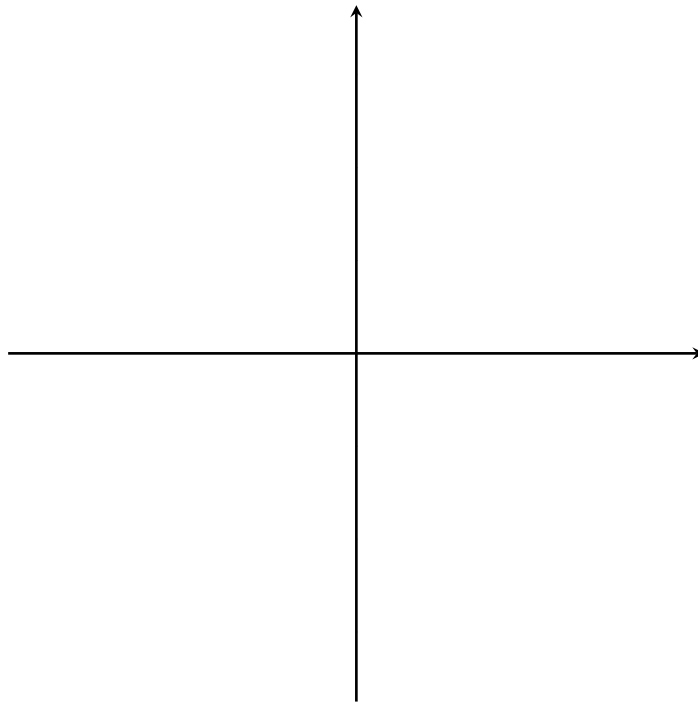_____ $f(x) = \log_2(-x)$ _____ $f(x) = -2\log_2(x)$

2. We will build a graph of $f(x) = \log_2(x + 1) + 2$.

    (a) What is the domain of f? What is the range of f?

    (b) We want to graph this function by transforming the graph of $g(x) = \log_2(x)$. How do we move from g to f with function transformations?

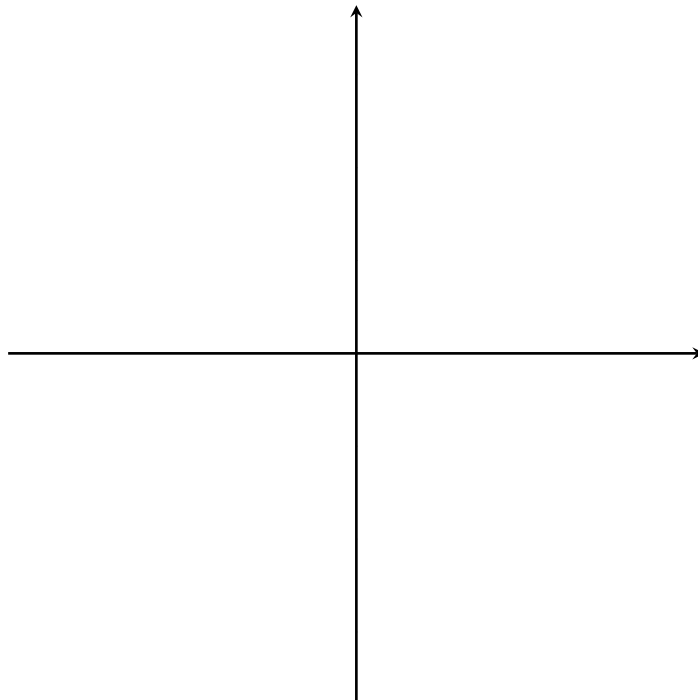   (c) Sketch the graphs of f and g, being sure to label three points on each graph.

    (d) List any and all vertical asymptotes, horizontal asymptotes, and end behavior.

3. We will build a graph of $f(x) = 3\log_{1/3}(x) + 1$.

    (a) What is the domain of f? What is the range of f?

    (b) We want to graph this function by transforming the graph of $g(x) = \log_{1/3}(x)$. How do we move from g to f with function transformations?

    (c) Sketch the graphs of f and g, being sure to label three points on each graph.
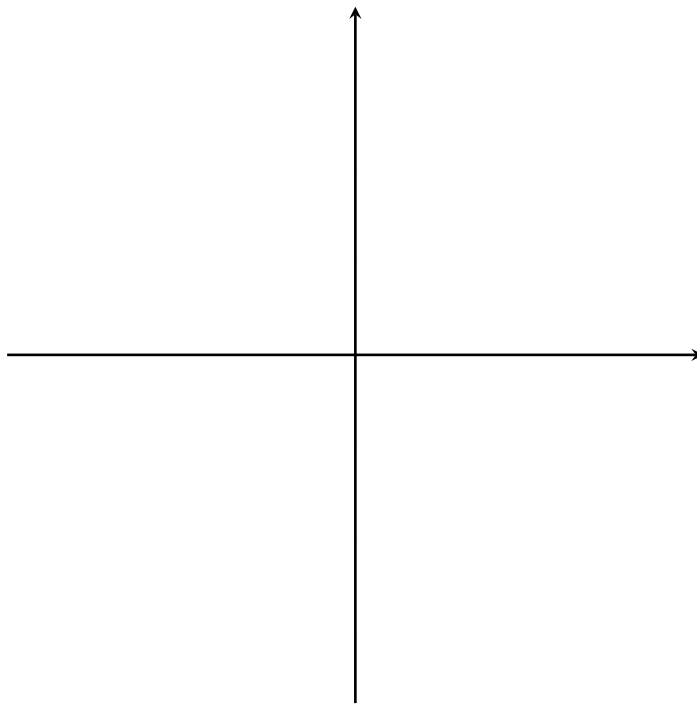

    (d) List any and all vertical asymptotes, horizontal asymptotes, and end behavior.

4. We will build a graph of $f(x) = -\log_3(3x - 6)$.

   (a) What is the domain of f? What is the range of f?

   (b) We want to graph this function by transforming the graph of $g(x) = \log_3(x)$. How do we move from g to f with function transformations?

   (c) Sketch the graphs of f and g, being sure to label three points on each graph.

   (d) List any and all vertical asymptotes, horizontal asymptotes, and end behavior.