**Problem Statements**

(1) Graphically verify whether \( f(x) = 2\sqrt[3]{x} - 2 \) and \( g(x) = \frac{x^3 + 2}{2} \) are inverse functions.

(2) Determine whether the function \( g(x) = \sqrt[4]{x^3} + 50 \) has an inverse, and, if it does, find the inverse function algebraically.

(3) Determine whether the function \( h(x) = |x + 3| + 2 \) where \( x \geq -3 \) has an inverse, and, if it does, find the inverse function algebraically.
(4) Determine whether the function \( f(x) = \frac{4 - 2x}{3x - 5} \) has an inverse, and, if it does, find the inverse function algebraically.

1. Describe the transformation(s) of the graph of \( f(x) = 3^x \) that yield(s) the graph of \( g(x) = 3^{-x+3} + 2 \).

   Transformations:
   Domain:
   \( y \)-intercept:
   Horizontal Asymptote:

2. Describe the transformation(s) of the graph of \( f(x) = e^x \) that yield(s) the graph of \( g(x) = -2e^{x-5} + 2 \).

   Transformations:
   Domain:
   \( y \)-intercept:
   Horizontal Asymptote:

3. Describe the transformation(s) of the graph of \( f(x) = 5^x \) that yield(s) the graph of \( g(x) = 5^{-0.7x} \), then choose the graph that matches the function.

   Transformations:
   Domain:
   \( x \)-intercept(s):
   Horizontal Asymptote(s):
4. Solve the equation for $x$: $3^{x^2} = 81$

5. Simplify each of the following without a calculator:
   a. $\log_4(64)$
   b. $7^{\log_7(4)} + 2$
   c. $\log(10^{-5})$
   d. $\log_{11}(3x + 5) = \log_{11}(9)$

6. Describe the transformations of $f(x) = \log_3(x)$ that yield $g(x) = -\log_3(x + 5) + 2$. Then state the domain, $x$-intercept, and vertical asymptote of the logarithmic function $f(x)$, then choose the graph that matches the function.

   Transformations:
   Domain:
   $x$-intercept(s):
   Vertical Asymptote(s):

7. Describe the transformations of $f(x) = \ln(x)$ that yield $g(x) = \ln(2x + 3) - 4$. Then state the domain, $x$-intercept, and vertical asymptote of the logarithmic function $g(x)$, then choose the graph that matches the function.

   Transformations:
   Domain:
   $x$-intercept(s):
   Vertical Asymptote(s):

8. Use the properties of logarithms to expand the expression as a sum, difference, and/or constant multiple of logarithms. (Assume all variables are positive.)
   (a) $\log_4(64x^2)$
   (b) $\ln \sqrt[3]{\frac{x^2}{x^2 - 8x - 20}}$
9. Use the properties of logarithms to condense the expression as a single logarithm. (Assume all variables are positive.)
   (a) \(2 \log_5(x - 1) + 4 \log_5(y) - 1\)
   (b) \(2 \ln(6) - \ln(8) - \ln(81)\)

10. Change \(\log_7(45)\) to base 5.

11. Change \(\log_6(x)\) to base 10