Complete on separate sheets of paper and attach.

1. Determine which function is one-to-one and give its inverse.
   
   \[ f(x) = 3x^2 - 4 \quad f(x) = \frac{5}{2}x - 3 \quad f(x) = |x + 3| + 1 \]

2. Graph the one-to-one function and its inverse from problem 1. Label the points and each line as \( f(x) \) or \( f^{-1}(x) \). Indicate the line of reflection as a dashed line.

3. Graph the following pair of functions on the same graph grid.
   
   a) \( y = 2^x \) and \( y = \log_2 x \)
   b) \( y = \log_2 x \) and \( y = \log_2 x + 4 \)

4. Given the following functions answer the following:
   
   \[ f(x) = 5^x \quad g(x) = 4x + 1 \quad p(x) = \log_4(x + 3) \quad q(x) = \frac{1}{4}x - \frac{1}{4} \]

   a) \( g(f(2)) = \)
   b) Verify that \( g(x) \) and \( q(x) \) are inverses using composition.
   c) \( \frac{f(2+h) - f(2)}{h} \) (set up only)
   d) Domain of \( p(x) \). Use interval notation! ⇆ No points otherwise.
   e) Range of \( f(x) \). Use interval notation.
   f) Domain \( p(x - 8) \) and \( p(x) - 11 \). Use interval notation.
   g) Range of \( f(x - 7) \) and \( f(x) - 7 \). Use interval notation.

5. Rewrite each exponent expression into logarithm form. (translate)
   
   a) \( 3^5 = 243 \) \quad b) \( 10^{-5} = 0.00001 \)

6. Rewrite each logarithm expression into exponent form. (translate)
   
   a) \( \log_6 36 = 2 \) \quad b) \( \ln x = 4 \)
7. Solve each equation.
   a) \( \log_8 64 = x \)  
   b) \( \log_{\frac{1}{10}} x = x \)  
   c) \( \log_x 7 = \frac{1}{2} \)  
   d) \( \log_5 (x + 1) = 3 \)  
   e) \( 2^{4x-3} = 16 \)  
   f) \( 3^x = 17 \)  
   g) \( \ln e^{x^2} = 0.13 \)  
   h) \( e^{5x-3} = 11 \)

8. Evaluate/simplify each expression.
   a) \( \log_9 (-9) \)  
   b) \( e^0 \)  
   c) \( \log 1 \)  
   d) \( \ln \sqrt{e} \)  
   e) \( \log \left( \frac{1}{100} \right) \)  
   f) \( \ln \sqrt{e} \)  
   g) \( \ln \sqrt{e^2} \)  
   h) \( e^{\ln 15} \)  
   i) \( e^{\ln (-3)} \)  
   j) \( e^{\ln \sqrt{x}} \)

9. Solve each logarithm equation. (You must show your work.)
   a) \( \log_4 x + \log_4 (x - 15) = 2 \)  
   b) \( \log_2 3 - \log_2 (x - 5) = \log_2 7 \)  
   c) \( \log_8 (x + 3) - \log_8 2x = \log_8 4 \)  
   d) \( \ln (2x^2 - 5) = \ln (x^2 - 1) \)  
   e) \( \log_3 (2x + 3) + \log_3 (4x - 1) = 2 \log_3 \)  
   f) \( \log_3 x + \log_3 5 = 1 \)

See “Additional Practice with Exponential and Log Equations Handout” (posted on website) for more practice.

10. Set up a compound interest expression for each set of given values. Solve for the unknown value. You may need to use common or natural logarithms to do this. Show your work. Do not use a calculator!
    a) How long will it take \$7,000 to triple in an account earning 3.2% compounded quarterly?
    b) If your money increases from \$450 to \$700 in 8 years with an account earning interest compounded annually, what rate of interest is required?
    c) How long will it take to double our \$600 in an account earning 4.9% compounded continuously?

11. Each of the given functions involves a shift (left, right, up, or down) or a reflection (x-axis or y-axis.) Write the letter that matches the change to each of the given functions.

\[
\begin{align*}
y &= 3^x - 4 & \quad & (A) \quad \text{up} \\
y &= 3^{-x} & \quad & (B) \quad \text{down} \\
y &= \log_2 (x + 1) & \quad & (C) \quad \text{left} \\
y &= -\log_2 x & \quad & (D) \quad \text{right} \\
\end{align*}
\]

(E) reflection about the x-axis (upside down)  
(F) reflection about the y-axis