Show all work!

Use compositions to determine if the two functions are inverses of each other. Explain your findings.

1) \( g(x) = \frac{4}{\sqrt{x - 6}} \) \( h(x) = x^4 + 6 \)

Find the inverse of the one-to-one function.

2) \( f(x) = \frac{3}{\sqrt{x - 6}} \)

Graph \( f \) as a solid line and \( f^{-1} \) as a dashed line in the same rectangular coordinate space. Use interval notation to give the domain and range of the indicated functions. Include a table of at least four values for \( f \) and \( f^{-1} \) below. (8 pts.)

3) \( f(x) = x^2 - 8, \quad x \geq 0 \)

Graph the function by changing the function to exponential form and creating a table of at least five values. Be sure to include both positive and negative values of the independent variable.

4) \( f(x) = 3^x \)

5) \( g(x) = \log_3 x \)

Describe the transformations needed to graph \( g(x) \).

6) How can the graph of \( f(x) = e^x \) be used to obtain the graph of \( g(x) = -e^{(x + 2)} + 3? \)
Use the functions below to answer the following questions.

7) \( y = b^x \)

A.) What kind of intercept, if any, does this function have? If there is an intercept, give its coordinate.

B.) Give the equation of the asymptote and tell what kind of asymptote it is.

C.) Find the domain and range of this function.
   (2pts)
   
   Domain:  
   Range:  

D.) What is the restriction on \( b \) if the function decreases along its entire domain?

8) \( y = \log_7 x \)

A.) What kind of intercept, if any, does this function have? If there is an intercept, give its coordinate.

B.) Give the equation of the asymptote and tell what kind of asymptote it is.

C.) Find the domain and range of this function.
   
   Domain:  
   Range:  

Use the compound interest formulas \( A = P\left(1 + \frac{r}{n}\right)^{nt} \) and \( A = Pert \) to solve.

9) Find the accumulated value of an investment of \$4000 at 7% compounded continuously for 5 years.

10) Find the accumulated value of an investment of \$900 at 12% compounded quarterly for 6 years.

Solve the problem.

11) The function \( D(h) = 6e^{-0.4h} \) can be used to determine the milligrams \( D \) of a certain drug in a patient's bloodstream \( h \) hours after the drug has been given. How many milligrams (to two decimals) will be present after 9 hours?

Write the equation in its equivalent exponential form.

12) \( \log_6 216 = x \)

Write the equation in its equivalent logarithmic form.

13) \( 3\sqrt[64]{4} = 4 \)

Evaluate the expression without using a calculator.

14) \( \log_{10} \frac{1}{\sqrt{10}} \)
Evaluate the expression without using a calculator.
15) \( \log_2 4 \)

Evaluate or simplify the expression without using a calculator.
16) \( \log 10^7 \)
17) \( \log 1000 \)
18) \( \ln e^9 \)
19) \( \ln \sqrt{\sqrt{e}} \)

Solve the equation.
23) \( 3^{(3x + 6)} = \frac{1}{27} \)

Describe the transformations.
20) How can the graph of \( \log_4 x \) be used to obtain the graph of \( f(x) = \log_4 (x - 2) \)?

Find the domain and the equation of the asymptote of the logarithmic function.
21) \( f(x) = \log_6 (x + 9) \)
26) \( \log_a \left( \frac{xy^6}{w^3z^7} \right) \)

Domain: ___________________________

Equation of Asymptote: ___________________________

Use common logarithms or natural logarithms and a calculator to evaluate to four decimal places.
22) \( \log_{0.2} 18 \)

Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.
24) \( \log_6 (6x) \)
25) \( \ln \left( \frac{e^6}{11} \right) \)
Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions.

27) \(\log_{10} 4 + \log_{10} 25\)

28) \(3 \log_6 x + 5 \log_6 (x - 6)\)

29) \(3 \log_4 2 + \frac{1}{7} \log_4 (r - 6) - \frac{1}{2} \log_4 r\)

30) \(\frac{2}{5} (\log_9 x + \log_9 y) - 4 \log_9 (x + 8)\)

Solve the logarithmic equation. Be sure to reject any value that is not in the domain of the original logarithmic expressions. Give the exact answer.

31) \(\log_4 (x + 4) = 3\)

32) \(\log_9 (x + 2) - \log_9 x = 2\)

33) \(\ln x + \ln (x + 1) = \ln 20\)
Solve the exponential equation.

34) \( e^{x + 8} = 6 \)

37) The function \( A = A_0 e^{-0.00693x} \) models the amount in pounds of a particular radioactive material stored in a concrete vault, where \( x \) is the number of years since the material was put into the vault. If 900 pounds of the material are initially put into the vault, how many pounds will be left after 30 years?

Solve the exponential equation.

35) \( 4(1 + 2x) = 65 \)

Solve the problem.

36) The function \( A = A_0 e^{-0.0077x} \) models the amount in pounds of a particular radioactive material stored in a concrete vault, where \( x \) is the number of years since the material was put into the vault. If 700 pounds of the material are placed in the vault, how much time will need to pass for only 150 pounds to remain?

38) The logistic growth function \( f(t) = \frac{400}{1 + 4.7e^{-0.2t}} \) describes the population of a species of butterflies \( t \) months after they are introduced to a non-threatening habitat. How many butterflies were initially introduced to the habitat?