

Name _____

For the given functions f and g, find the requested composite function.

1) $f(x) = \sqrt{x+3}$, $g(x) = 8x - 7$; Find $(f \circ g)(x)$.

1) _____

Find the domain of the composite function $f \circ g$.

2) $f(x) = x + 9$; $g(x) = \frac{9}{x+6}$

2) _____

For the given functions f and g, find the requested composite function value.

3) $f(x) = \frac{x-6}{x}$, $g(x) = x^2 + 9$; Find $(g \circ f)(-2)$.

3) _____

The function f is one-to-one. Find its inverse.

4) Determine the equation for the inverse function of $y = (x + 2)^3 - 8$.

4) _____

5) $f(x) = \frac{4x+5}{3}$

5) _____

Find the inverse function of f . State the domain and the range of f and of f^{-1} .

6) $f(x) = \frac{3x - 2}{x + 5}$

6) _____

$f^{-1}(x) =$ _____

Domain of f :

Range of f :

Domain of $f^{-1}(x)$:

Range of $f^{-1}(x)$:

The graph of a one-to-one function f is given. Draw the graph of the inverse function f^{-1} as a dashed line or curve.

7) $f(x) = \sqrt{x + 4}$

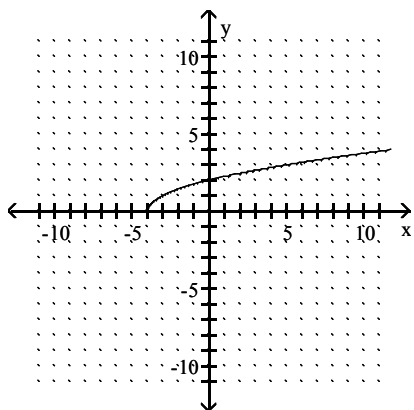
Find the equation and the graph of the inverse and its domain and range.

7) _____

$f^{-1}(x) =$

Domain:

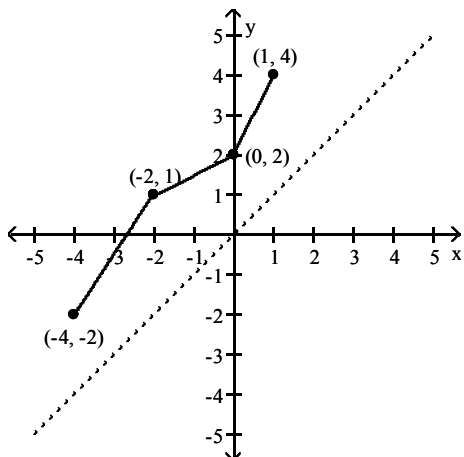
Range:



Use the graph of the given one-to-one function to sketch the graph of the inverse function. For convenience, the graph of $y = x$ is also given.

8)

8) _____



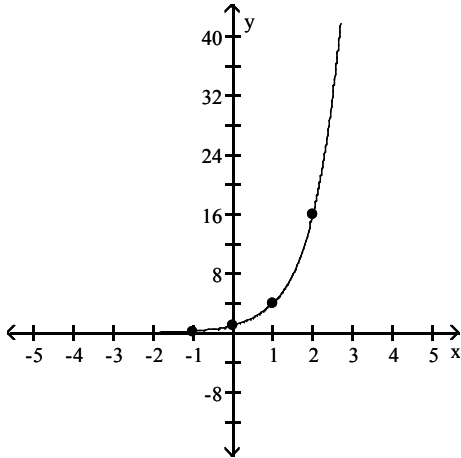
Solve the problem.

- 9) The function $D(h) = 8e^{-0.4h}$ 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 11 hours? 9) _____

Determine the exponential function whose graph is given.

10)

10) _____



A) $f(x) = -4^x$

B) $f(x) = 4^x$

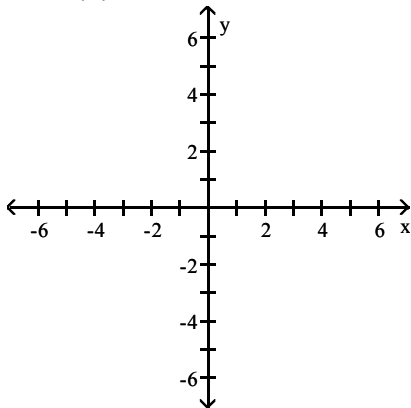
C) $f(x) = -4^{-x}$

D) $f(x) = 4^{-x}$

a) Graph the function using 3 key points; b) Find the domain and the range of the function.

11) $f(x) = \left(\frac{1}{3}\right)^x$

11) _____



Solve the equation without using a calculator. Show all the necessary steps.

12) $5^x = \frac{1}{625}$

12) _____

$$13) 2(7 - 3x) = \frac{1}{4}$$

13) _____

$$14) 2(x^2 - 3) = 64$$

14) _____

Convert to logarithmic form.

$$15) 7^3 = 343$$

15) _____

$$16) e^x = 9$$

16) _____

Convert to exponential form.

$$17) \log_{1/3} 27 = -3$$

17) _____

Change logarithmic expression to exponential expression.

18) $\log_b 49 = \frac{2}{3}$

18) _____

Find the value of the expression without using a calculator.

19) $\log_7 \frac{1}{49}$

19) _____

Use a calculator to find the natural logarithm correct to four decimal places.

20) $\ln \sqrt{33}$

20) _____

Use the properties of logarithms to find the exact value of the expression. Do not use a calculator.

21) $\log_5 10 - \log_5 2$

21) _____

Using the properties of logarithms, evaluate the expression.

22) $2 \ln e^{4.2}$

22) _____

23) Given $\log_b 2 = 0.3$ and $\log_b 3 = 0.48$ use the properties of logarithms to find $\log_b \frac{27}{16}$
without using a calculator.

23) _____

Write as the sum and/or difference of logs. Do not use exponents.

$$24) \log_6 \frac{13\sqrt{m}}{n}$$

24) _____

$$25) \log_{19} \frac{\sqrt[4]{9}}{n^2m}$$

25) _____

Write the logarithmic expression as a sum and difference of logarithms. Write the exponents as factors.

$$26) \log_a \frac{x^4 \sqrt[3]{x+5}}{(x-2)^2}$$

26) _____

Express as a single logarithm.

$$27) (\log_a x - \log_a y) + 4 \log_a z$$

27) _____

Write expressions as a single logarithm.

$$28) \frac{3}{4} \ln 16 - \ln(4^2 - 3^2 - 2)$$

28) _____

Use the Change-of-Base Formula and a calculator to evaluate the logarithm. Round your answer to two decimal places.

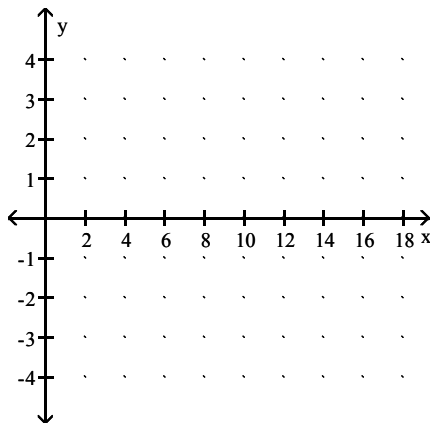
29) Evaluate $\log_3 25$.

29) _____

Graph the function using a graphing utility and the Change-of-Base Formula.

30) $y = \log_6 x$

30) _____



Find the domain of the function.

31) $f(x) = \log(x - 4)$

31) _____

32) Find the inverse of the following functions: a) $f(x) = 4^x + 7$ b) $g(x) = \ln(x + 2)$

32) _____

Solve the equation.

33) $\log_3 x = 5$

33) _____

34) $y = \log_3 \frac{32}{243}$ (Do not use a calculator. Convert to exponential form first)

34) _____

Solve the equation.

35) $\log(2 + x) - \log(x - 4) = \log 3$

35) _____

Solve the given logarithmic equation.

36) $\log_2(3x - 2) - \log_2(x - 5) = 4$

36) _____

Solve the equation.

37) $\log_3 x + \log_3(x - 24) = 4$

37) _____

38) $\log 4x = \log 5 + \log(x - 4)$

38) _____

Solve the equation. If necessary, round your answer to two decimal places.

39) $4(3x - 1) = 12$

39) _____

Solve the given exponential equation.

40) $3 \cdot 5^{2t - 1} = 75$

40) _____

Solve the exponential equation. Express the solution set in terms of natural logarithms.

41) $4^{x+4} = 5^{2x+5}$

41) _____

Find the time needed to double your money. Express your answer rounded to 2 decimal places.

42) How many years will it take for \$10,000 to double in value if it earns 7% compounded continuously? Round answer to two decimal places.

42) _____

Solve the problem.

43) The size P of a small herbivore population at time t (in years) obeys the function $P(t) = 500e^{0.22t}$ if they have enough food and the predator population stays constant. After how many years will the population reach 2500 ?

43) _____

44) Strontium 90 decays at a constant rate of 2.44% per year. Therefore, the equation for the amount P of strontium 90 after t years is $P = P_0 e^{-0.0244t}$. How long will it take for 15 grams of strontium to decay to 5 grams? Round answer to 2 decimal places. 44) _____

45) A certain radioactive isotope decays at a rate of 0.2% annually. Determine the half-life of this isotope, to the nearest year. 45) _____

46) A certain radioactive isotope has a half-life of 555 years. Determine the annual decay rate, k . 46) _____

Answer the question.

47) Define the number e . 47) _____

A) The number approximately equal to 2.72.

B) The number defined by $e = \lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n$ in Calculus.

C) The number that the expression, $\left(1 + \frac{1}{n}\right)^n$, approaches as $n \rightarrow \infty$.

D) All of the above.

Answer Key

Testname: 105REV_E4_0112

1) $2\sqrt{2x-1}$

2) $\{x \mid x \neq -6\}$

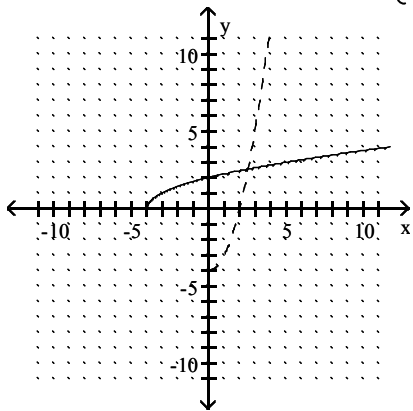
3) 25

4) $y = \sqrt[3]{x+8} - 2$

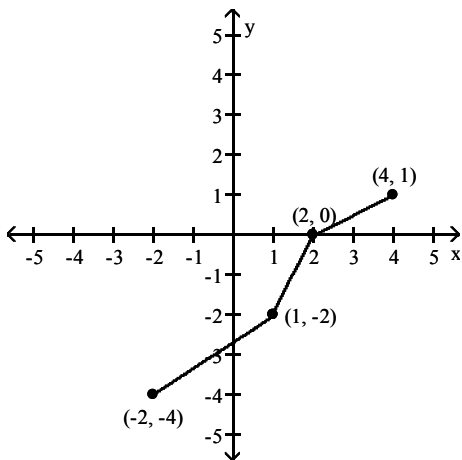
5) $f^{-1}(x) = \frac{3x-5}{4}$

6) $f^{-1}(x) = \frac{5x+2}{3-x}$; domain of f: $\{x \mid x \neq -5\}$; range of f: $\{y \mid y \neq 3\}$

7) $f^{-1}(x) = x^2 - 4$ for $x \geq 0$; Domain: $\{x \mid x \geq 0\}$; Range: $\{y \mid y \geq -4\}$



8)



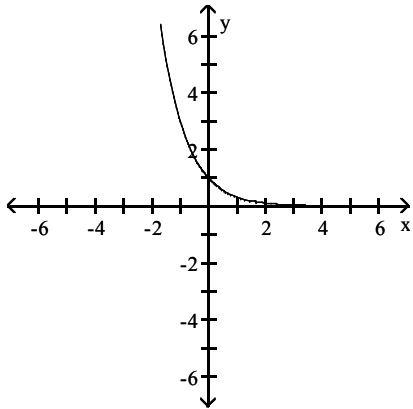
9) 0.1 mg

10) B

Answer Key

Testname: 105REV_E4_0112

11) Key points: $(-1, 3)$, $(0, 1)$, $(1, \frac{1}{3})$; b) Domain: $(-\infty, \infty)$; Range: $(0, \infty)$



12) $\{-4\}$

13) $\{3\}$

14) $x = 3$ or $x = -3$

15) $\log_7 343 = 3$

16) $\ln 9 = x$

17) $(\frac{1}{3})^{-3} = 27$

18) $b^{2/3} = 49$

19) -2

20) 1.7483

21) 1

22) 8.4

23) $\log_b \frac{27}{16} = 0.24$

24) $\log_6 13 + \frac{1}{2} \log_6 m - \log_6 n$

25) $\frac{1}{4} \log_{19} 9 - 2 \log_{19} n - \log_{19} m$

26) $4 \log_a x + \frac{1}{3} \log_a (x + 5) - 2 \log_a (x - 2)$

27) $\log_a \frac{xz^4}{y}$

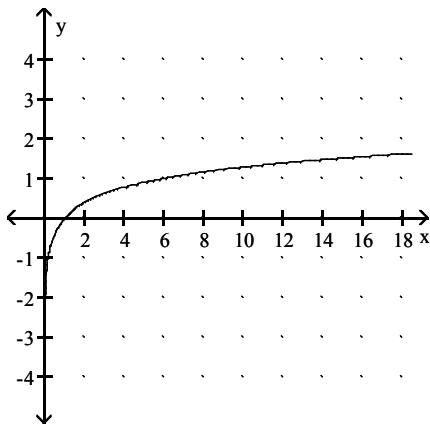
28) $\ln(\frac{8}{5})$

29) 2.93

Answer Key

Testname: 105REV_E4_0112

30) Use a graphing calculator to graph $y = \frac{\log x}{\log 6}$, or prepare a table of values with 3 key points: $(1/6, -1)$, $(1, 0)$ and $(6, 1)$



31) $\{x|x > 4\}$

32) a) $f^{-1}(x) = \log_4(x - 7)$ b) $g^{-1}(x) = e^x - 2$

33) $\{243\}$

34) $\left(\frac{3}{2}\right)^y = \frac{32}{243} = \left(\frac{3}{2}\right)^{-5} \rightarrow y = -5$

35) $\{7\}$

36) $x = 6$

37) $\{27\}$

38) $\{20\}$

39) $\{0.93\}$

40) $t = \frac{3}{2}$

41) $\left\{ \frac{5 \ln 5 - 4 \ln 4}{\ln 4 - 2 \ln 5} \right\}$

42) 9.90 years

43) 7.32 yrs

44) 45.03 years.

45) 347 yr

46) 0.125%

47) D