1.

Given $f(x) = 9x$ and $g(x) = 2x^2 + 3$, find

(a) $(f \circ g)(4)$ (b) $(g \circ f)(2)$ (c) $(f \circ f)(1)$ (d) $(g \circ g)(0)$

(a) What is $(f \circ g)(4)$?

$(f \circ g)(4) = \boxed{}$

(b) What is $(g \circ f)(2)$?

$(g \circ f)(2) = \boxed{}$

(c) What is $(f \circ f)(1)$?

$(f \circ f)(1) = \boxed{}$

(d) What is $(g \circ g)(0)$?

$(g \circ g)(0) = \boxed{}$

2.

Given $f(x) = 5x^2 - 4$ and $g(x) = 6 - \dfrac{1}{2}x^2$, find the following expressions.

(a) $(f \circ g)(4)$ (b) $(g \circ f)(2)$ (c) $(f \circ f)(1)$ (d) $(g \circ g)(0)$

(a) $(f \circ g)(4) = \boxed{}$ (Simplify your answer.)

(b) $(g \circ f)(2) = \boxed{}$ (Simplify your answer.)

(c) $(f \circ f)(1) = \boxed{}$ (Simplify your answer.)

(d) $(g \circ g)(0) = \boxed{}$ (Simplify your answer.)

3.

Given $f(x) = 2\sqrt{x}$ and $g(x) = 7x$, find the following expressions.

(a) $(f \circ g)(4)$ (b) $(g \circ f)(2)$ (c) $(f \circ f)(1)$ (d) $(g \circ g)(0)$

(a) $(f \circ g)(4) = \square$
(Type an exact answer, using radicals as needed. Simplify your answer.)

(b) $(g \circ f)(2) = \square$
(Type an exact answer, using radicals as needed. Simplify your answer.)

(c) $(f \circ f)(1) = \square$
(Type an exact answer, using radicals as needed. Simplify your answer.)

(d) $(g \circ g)(0) = \square$
(Type an exact answer, using radicals as needed. Simplify your answer.)

4.

For $f(x) = 4x$ and $g(x) = \dfrac{1}{4}x$, find $(f \circ g)(x)$ and $(g \circ f)(x)$. Then determine whether $(f \circ g)(x) = (g \circ f)(x)$.

What is $(f \circ g)(x)$?
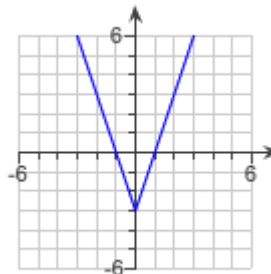
$(f \circ g)(x) = \square$

What is $(g \circ f)(x)$?

$(g \circ f)(x) = \square$

Does $(f \circ g)(x) = (g \circ f)(x)$?

○ Yes
○ No

5.

For $f(x) = 4x - 2$ and $g(x) = \dfrac{1}{4}(x+2)$, find $(f \circ g)(x)$ and $(g \circ f)(x)$. Then determine whether $(f \circ g)(x) = (g \circ f)(x)$.

What is $(f \circ g)(x)$?

$(f \circ g)(x) = \boxed{}$

What is $(g \circ f)(x)$?

$(g \circ f)(x) = \boxed{}$

Does $(f \circ g)(x) = (g \circ f)(x)$?

○ Yes
○ No

6.

The graph of a function f is given. Use the horizontal-line test to determine whether f is one-to-one.

Is f one-to-one? Choose the correct answer below.

○ No
○ Yes

7.

Find the inverse of the one-to-one function. State the domain and range of the inverse function.

$\{(0, -5), (-13,5), (9,2), (-5, -3), (5, -11)\}$

Which of the following is the inverse function?
- ○ $\{(5, -11), (-5, -3), (9,2), (-13,5), (0, -5)\}$
- ○ $\{(-5,5), (5, -5), (2,9), (-3, -13), (-11,0)\}$
- ○ $\{(0,5), (13, -5), (-9, -2), (5,3), (-5,11)\}$
- ○ $\{(-5,0), (5, -13), (2,9), (-3, -5), (-11,5)\}$

What is the domain of the inverse function?
- ○ $\{-5, 5, 2, -3, -11\}$
- ○ $\{-11\}$
- ○ $\{0, -13, 9, -5, 5\}$
- ○ $\{0\}$

What is the range of the inverse function?
- ○ $\{-11\}$
- ○ $\{0\}$
- ○ $\{-5, 5, 2, -3, -11\}$
- ○ $\{0, -13, 9, -5, 5\}$

8.

Consider the functions $f(x) = x^3 - 9$ and $g(x) = \sqrt[3]{x+9}$.
(a) Find f(g(x)).
(b) Find g(f(x)).
(c) Determine whether the functions f and g are inverses of each other.

(a) What is f(g(x))?

$f(g(x)) = \boxed{}$ (Simplify your answer.)

Give any values of x that need to be excluded from f(g(x)).

$x \neq \boxed{}$
(Type N if no values should be excluded from the domain. Use a comma to separate answers as needed.)

(b) What is g(f(x))?

$g(f(x)) = \boxed{}$ (Simplify your answer.)

Give any values of x that need to be excluded from g(f(x)).

$x \neq \boxed{}$
(Type N if no values should be excluded from the domain. Use a comma to separate answers as needed.)

(c) Are the functions f and g inverses of each other? Choose the correct answer below.
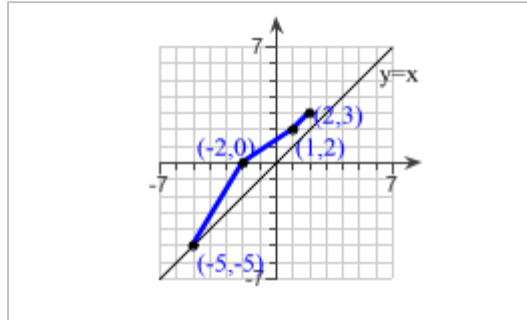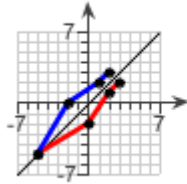
○ No
○ Yes

9.

The graph of a one-to-one function f is given. Draw the graph of the inverse function f^{-1}. For convenience (and as a hint), the graph of $y = x$ is also given.
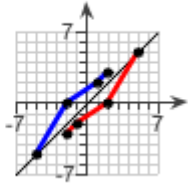

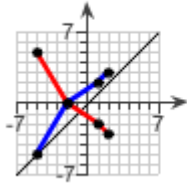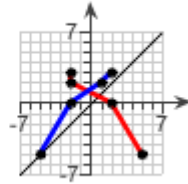Choose the correct graph of the inverse function f^{-1} below.

○ A. ○ B. ○ C. ○ D.

10.

The function $f(x) = 5x$ is one-to-one.
(a) Find the inverse of f.
(b) State the domain and range of f.
(c) State the domain and range of f^{-1}.
(d) Graph f, f^{-1}, and $y = x$ on the same set of axes.

(a) What is the inverse of f?

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

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

(b) State the domain and range of f.

The domain of f is $\{x | \boxed{}\}$.
The range of f is $\{y | \boxed{}\}$.

(Type an inequality or a compound inequality. Use integers or fractions for any numbers in the expression. Type R if the answer is all real numbers.)
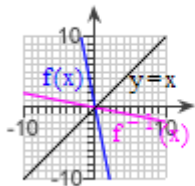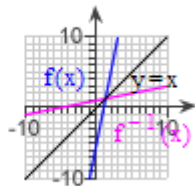
(c) State the domain and range of f^{-1}.

The domain of f^{-1} is $\{x | \boxed{}\}$.
The range of f^{-1} is $\{y | \boxed{}\}$.

(Type an inequality or a compound inequality. Use integers or fractions for any numbers in the expression. Type R if the answer is all real numbers.)

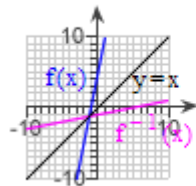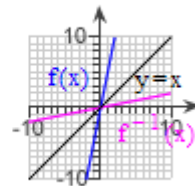(d) Graph f, f^{-1}, and $y = x$ on the same set of axes. Choose the correct graph below.

○ A.   ○ B.   ○ C.   ○ D.

11.

The function $f(x) = 5x + 1$ is one-to-one.
(a) Find the inverse of f.
(b) State the domain and range of f.
(c) State the domain and range of f^{-1}.
(d) Graph f, f^{-1}, and $y = x$ on the same set of axes.

(a) What is the inverse of f?

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

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

(b) State the domain and range of f.

The domain of f is $\{x | \boxed{}\}$.
The range of f is $\{y | \boxed{}\}$.
(Type an inequality or a compound inequality. Use integers or fractions for any numbers in the expression. Type R if the answer is all real numbers.)
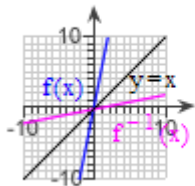
(c) State the domain and range of f^{-1}.

The domain of f^{-1} is $\{x | \boxed{}\}$.
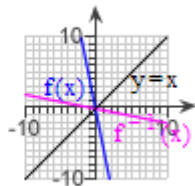The range of f^{-1} is $\{y | \boxed{}\}$.
(Type an inequality or a compound inequality. Use integers or fractions for any numbers in the expression. Type R if the answer is all real numbers.)

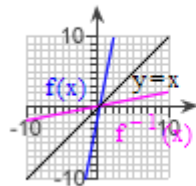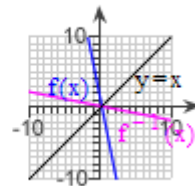(d) Graph f, f^{-1}, and $y = x$ on the same set of axes. Choose the correct graph below.

○ A.   ○ B.   ○ C.   ○ D.

12.

Match the graph to one of the following functions.

A. $y = 2^x$ B. $y = 2^{-x}$

C. $y = -2^x$ D. $y = -2^{-x}$

E. $y = 2^x - 1$ F. $y = 2^{x-1}$

G. $y = 2^{1-x}$ H. $y = 1 - 2^x$
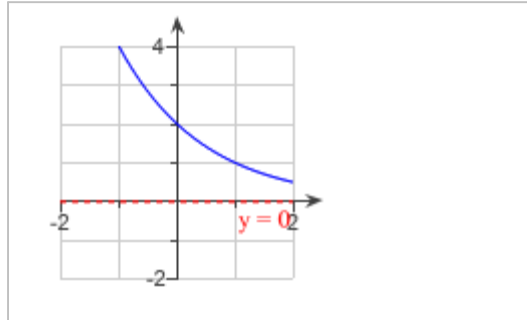
Which function is represented by the graph?
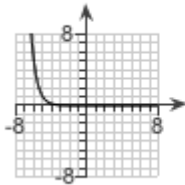
☐ (Type A, B, C, D, E, F, G, or H.)

13.

Use transformations to identify the graph of the function. Then determine its domain, range, and horizontal asymptote.
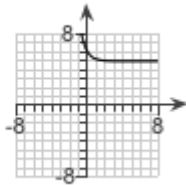
$f(x) = 5^{-x} + 5$

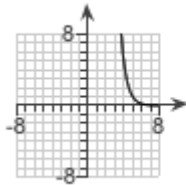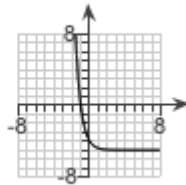Identify the graph of $f(x) = 5^{-x} + 5$.

○ A.   ○ B.   ○ C.   ○ D.

What is the domain of $f(x) = 5^{-x} + 5$?

☐ (Type your answer in interval notation.)

What is the range of $f(x) = 5^{-x} + 5$?

☐ (Type your answer in interval notation.)

What is the horizontal asymptote of $f(x) = 5^{-x} + 5$?

$y = $ ☐

14.

Use transformations to identify the graph of the function. Then determine its domain, range, and horizontal asymptote.

$$f(x) = 6 + e^{-x}$$

Identify the graph of $f(x) = 6 + e^{-x}$.

○ A. ○ B. ○ C. ○ D.
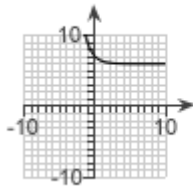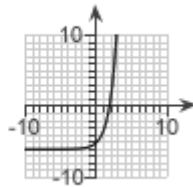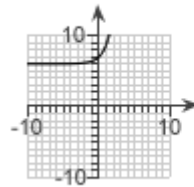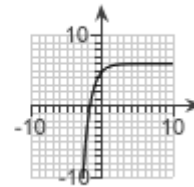
What is the domain of $f(x) = 6 + e^{-x}$?

☐ (Use interval notation. If the answer is all real numbers, type R.)

What is the range of $f(x) = 6 + e^{-x}$?

☐ (Use interval notation. If the answer is all real numbers, type R.)

What is the horizontal asymptote of $f(x) = 6 + e^{-x}$?

$y = $ ☐

15.

Solve the equation.

$$\left(\frac{3}{2}\right)^x = \left(\frac{27}{8}\right)$$

$x = $ ☐
(Simplify your answer. Type an integer or a fraction.)

16.

Solve the equation.

$$4^{3x+1} = 64$$

$x = \boxed{}$

(Simplify your answer. Type an integer or a fraction. Use a comma to separate answers as needed.)

17.

Change the exponential expression to an equivalent expression involving a logarithm.

$$8.2 = a^6$$

The equivalent logarithmic expression is $\boxed{}$. (Type an equation.)

18.

Change the logarithmic expression to an equivalent expression involving an exponent.

$$\log_2 8 = x$$

The equivalent exponential expression is $\boxed{}$. (Type an equation.)

19.

Find the exact value of the logarithm without using a calculator.

$$\log_7 49$$

$\log_7 49 = \boxed{}$

20.

Find the domain of the function.

$$f(x) = \ln(x - 1)$$

The domain of **f** is $\boxed{}$.

(Type your answer in interval notation. Type R if the answer is all real numbers.)

21.

Use a calculator to evaluate the expression.

$$\frac{\ln \frac{13}{10}}{0.03}$$

$\dfrac{\ln \frac{13}{10}}{0.03} \approx \boxed{}$ (Round your answer to three decimal places.)

22.

The graph of a logarithmic function is given. Match the graph to its function.
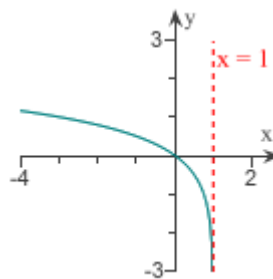
Which function matches the graph?

- A. $y = \log_4 x$
- B. $y = 1 - \log_4 x$
- C. $y = -\log_4 x$
- D. $y = \log_4(x-1)$
- E. $y = \log_4 x - 1$
- F. $y = \log_4(-x)$
- G. $y = -\log_4(-x)$
- H. $y = \log_4(1-x)$

23.

Solve the equation.

$$\log_3 x = 4$$

$x = \boxed{}$

24.

Solve the equation.

$$\log_2(4x+9) = 3$$

$x = \boxed{}$ (Type an integer or a simplified fraction.)

25.

Solve the equation.

$$e^{8x} = 7$$

$x = \boxed{}$ (Type an exact answer.)

26.

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

$$\log_6 24 - \log_6 4$$

$\log_6 24 - \log_6 4 = \boxed{}$

27.

Suppose that $\ln 2 = s$ and $\ln 11 = t$. Use properties of logarithms to write the logarithm in terms of s and t.

$$\ln 5.5$$

$\ln 5.5 = \boxed{}$

28.

Write the expression as a sum and/or difference of logarithms. Express powers as factors.

$$\log_2(8x)$$

$\log_2(8x) = \boxed{}$ (Type an exact answer in simplified form.)

29.

Write the expression as a single logarithm.

$$5\log_3 u + 9\log_3 v$$

$5\log_3 u + 9\log_3 v = \log_3\left(\boxed{}\right)$

30. Write the expression as a single logarithm.

$$\log_3(x^2 - 64) - 9\log_3(x+8)$$

$\log_3(x^2 - 64) - 9\log_3(x+8) = \log_3 \square$ (Simplify your answer.)

---

31. Use the change-of-base formula and a calculator to evaluate the logarithm.

$$\log_7 42$$

$\log_7 42 = \square$

(Do not round until the final answer. Then round to the nearest thousandth as needed.)

---

32. Use the change-of-base formula and a calculator to evaluate the logarithm. Round your answer to three decimal places.

$$\log_{1/5} 8$$

$\log_{1/5} 8 \approx \square$

(Do not round until the final answer. Then round to three decimal places as needed.)

---

33. Solve the following logarithmic equation.

$$\log_2(5x) = 4$$

$x = \square$

(Type an exact solution, using radicals and log functions as needed. Use a comma to separate answers as needed. Type N if there is no solution.)

---

34. Solve the following logarithmic equation.

$$2\log_3 x = -\log_3 9$$

$x = \square$

(Type an exact solution, using radicals and log functions as needed. Use a comma to separate answers as needed. Type N if there is no solution.)

35.

Solve the following logarithmic equation.

$$\log_5(x+131) + \log_5(x+11) = 4$$

$x = \boxed{}$

(Type an exact solution, using radicals and log functions as needed. Use a comma to separate answers as needed. Type N if there is no solution.)

36.

Solve the equation.

$$3^x = 7$$

$x = \boxed{}$

(Type an exact solution, using radicals and log functions as needed. Use a comma to separate answers as needed. Type N if there is no solution.)

37.

Solve the equation.

$$6^{1-9x} = 7^x$$

$x = \boxed{}$

(Type an exact solution, using radicals and log functions as needed. Use a comma to separate answers as needed. Type N if there is no solution.)

1. 315
    651
    81
    21

2. 16
    -122
    1
    -12

3. $4\sqrt{7}$
    $14\sqrt{2}$
    $2\sqrt{2}$
    0

4. x
    x
    the first choice

5. x
    x
    the first choice

6. the first choice

7. the fourth choice
    the first choice
    the fourth choice

8. x
    N
    x
    N
    the second choice

9. A

10. $\dfrac{x}{5}$

R
R
R
R
D

11. $\dfrac{x}{5} - \dfrac{1}{5}$

R
R
R
R
A

12. G

13. B

$(-\infty, \infty)$

$(5, \infty)$

5

14. A

R

$(6, \infty)$

6

15. 3

16. $\dfrac{2}{3}$

17. $6 = \log_a 8.2$

18. $8 = 2^x$

19. 2

20. $(1, \infty)$

21. 8.745

22.   H

23.   81

24. $-\dfrac{1}{4}$

25. $\dfrac{\ln 7}{8}$

26.   1

27. $t - s$

28. $3 + \log_2 x$

29. $u^5 v^9$

30. $\dfrac{x - 8}{(x + 8)^8}$

31.   1.921

32. -1.292

33. $\dfrac{16}{5}$

34. $\dfrac{1}{3}$

35. -6

36. $\dfrac{\ln 7}{\ln 3}$

37. $\dfrac{\ln 6}{9 \ln 6 + \ln 7}$