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

1) $f(x) = 2x + 4$; $g(x) = 4x^2 + 1$; Find $(f \circ f)(1)$.

Find the indicated composite for the pair of functions.

2) $(f \circ g)(x)$: $f(x) = \sqrt{x + 4}$, $g(x) = 8x - 8$

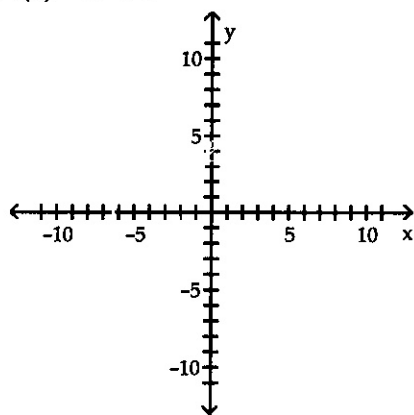Find the domain of the composite function $f \circ g$.

3) $f(x) = \dfrac{x}{x + 9}$; $g(x) = \dfrac{9}{x + 2}$

Decide whether or not the functions are inverses of each other.

4) $f(x) = 9x + 6$; $g(x) = \dfrac{x}{9} - 6$

Graph the function as a solid line or curve and its inverse as a dashed line or curve on the same axes.

5) $f(x) = x^3 + 4$

If the following defines a one–to–one function, find the inverse.

6) $f(x) = (x + 2)^3 - 8$.

Approximate the value using a calculator. Express answer rounded to three decimal places.
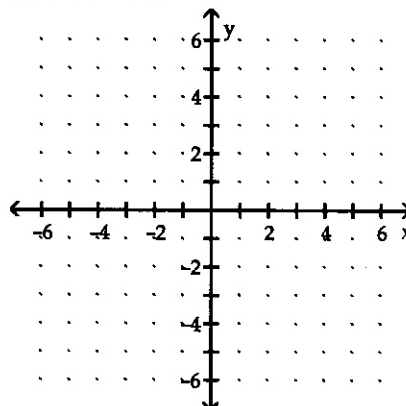
7) $4.4^{4.16}$

Determine whether the given function is exponential or not. If it is exponential, identify the value of the base a.

8)

x	H(x)
-1	3
0	7
1	11
2	15
3	19

Use transformations to graph the function. Determine the domain, range, and vertical asymptote of the function.

9) $f(x) = 4^{-x} + 3$

Solve the equation.

10) $3^{6 - 3x} = \dfrac{1}{27}$

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

11) $5^{-3} = \dfrac{1}{125}$

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

12) Write in exponential form: $y = \log_{61} x$

Find the exact value of the logarithmic expression.
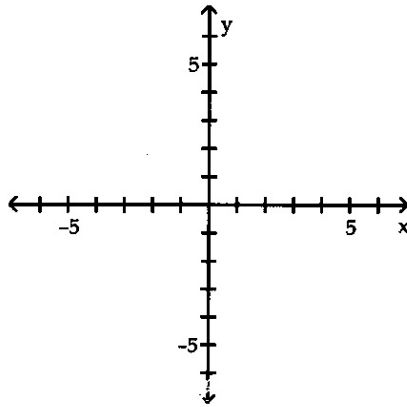
13) $\log_5 1$

14) $\log_4 \sqrt{4}$

15) $\ln e$

Solve the problem.

16) Determine the domain of the function
$f(x) = \log_5(x + 2)$.

Graph the function.

17) $f(x) = -4 \ln x$

Solve the equation.

18) $\log_5 x = 2$

Find the value of the expression.

19) Let $\log_b A = 4$ and $\log_b B = -20$. Find $\log_b \dfrac{A}{B}$.

Express y as a function of x. The constant C is a positive number.

20) $\ln y = \ln 4x + \ln C$

Write as the sum and/or difference of logs. Express powers as factors.

21) $\log_3 \dfrac{16\sqrt{x}}{y}$

Express as a single logarithm.

22) $6\log_c q - \dfrac{5}{6}\log_c r + \dfrac{1}{2}\log_c f - 5\log_c p$

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

23) $\log_{6.3} 2.1$

Solve the equation.

24) $\dfrac{1}{3} \log_2 (x + 6) = \log_8 3x$

Solve the problem.

25) Solve for x correct to two decimal places:
$\log x + \log 6 = 0.3031$

26) Solve $\pi^{x+1} = e^{2x}$ and express the answer interms of natural logarithms.

Compute the amount in m years if a principal P is invested at a nominal annual interest rate of r compounded as given. Round to the nearest cent.

27) $P = \$480$, $m = 6$, $r = 11\%$ compounded quarterly

Find the effective rate of interest.

28) 9.1% compounded continuously

Find the present value required to achieve the amount A when compounded at a rate of r for t years. Round to the nearest cent.

29) $A = \$10,000$, $t = 2$, $r = 18\%$ compounded monthly

Solve the problem. Round your answer to three decimals.

30) What annual rate of interest is required to double an investment in 9 years?

Solve the problem.

31) Conservationists tagged 120 black–nosed rabbits in a national forest in 1990. In 1992, they tagged 240 black–nosed rabbits in the same range. If the rabbit population follows the exponential law, how many rabbits will be in the range 8 years from 1990?

32) A fossilized leaf contains 25% of its normal amount of carbon 14. How old is the fossil (to the nearest year)? Use 5600 years as the half-life of carbon 14.

33) A thermometer reading 79°F is placed inside a cold storage room with a constant temperature of 38°F. If the thermometer reads 74°F in 10 minutes, how long before it reaches 58°F? Assume the cooling follows Newton's Law of Cooling:

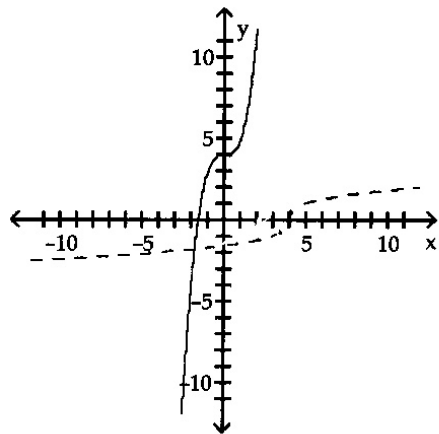$$U = T + (U_0 - T)e^{kt}.$$

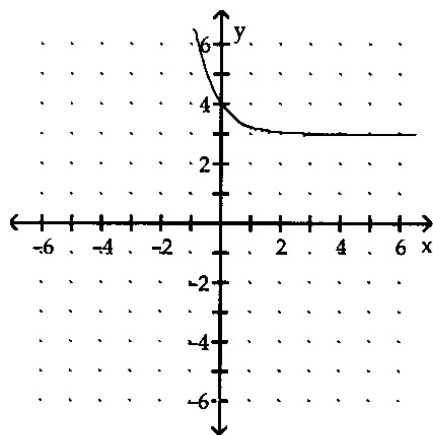(Round your answer to the nearest whole minute.)

1) 16
2) $2\sqrt{2x-1}$
3) $\{x \mid x \neq -2, x \neq -3\}$
4) No
5)
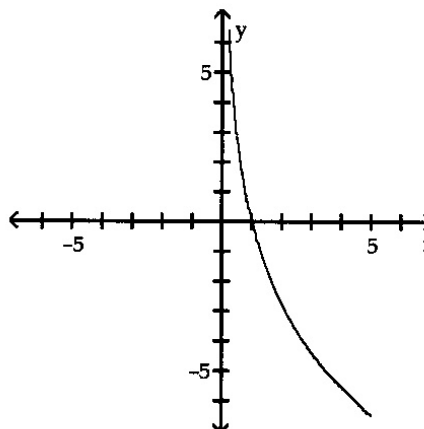

6) $f^{-1}(x) = \sqrt[3]{x+8} - 2$
7) 475.076
8) not exponential
9)

domain of f: $(-\infty, \infty)$; range of f:$(3, \infty)$
horizontal asymptote: $y = 3$

10) 3
11) $\log_5 \frac{1}{125} = -3$
12) $61^y = x$
13) 0
14) $\frac{1}{2}$
15) 1
16) $(-2, \infty)$

17)

18) 25
19) 24
20) $y = 4Cx$
21) $\log_3 16 + \frac{1}{2}\log_3 x - \log_3 y$
22) $\log_c \frac{q^6\, f^{1/2}}{r^{5/6}\, p^5}$
23) 0.403
24) 3
25) 0.33
26) $x = \dfrac{\ln \pi}{2 - \ln \pi}$
27) $920.46
28) 9.527%
29) $6995.44
30) 8.006%
31) 1920
32) 11,180
33) 55 minutes