

Graph the function by making a table of coordinates.

1) $f(x) = \left(\frac{1}{4}\right)^x$

Graph the function.

2) Use the graph of $f(x) = 2^x$ to obtain the graph of $g(x) = 2^x - 4$.

3) Use the graph of $f(x) = 3^x$ to obtain the graph of $g(x) = -3^x$.

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

4) Find the accumulated value of an investment of \$2000 at 4% compounded annually for 14 years.

5) Find the accumulated value of an investment of \$6000 at 8% compounded continuously for 4 years.

Write the equation in its equivalent exponential form.

6) $\log_3 9 = x$

6) _____

Write the equation in its equivalent logarithmic form.

7) $b^2 = 64$

7) _____

Evaluate the expression without using a calculator.

8) $\log_5 \frac{1}{125}$

8) _____

Graph the function.

9) Use the graph of $\log_5 x$ to obtain the graph of $f(x) = 2 + \log_5 x$.

Find the domain of the logarithmic function.

10) $f(x) = \ln(5 - x)$

10) _____

11) $f(x) = \ln\left(\frac{1}{x - 6}\right)$

11) _____

Solve the problem.

- 12) The pH of a solution ranges from 0 to 14. An acid has a pH less than 7. Pure water is neutral and has a pH of 7. The pH of a solution is given by $\text{pH} = -\log x$ where x represents the concentration of the hydrogen ions in the solution in moles per liter. Find the pH if the hydrogen ion concentration is 6.4×10^{-3} .

Graph the function.

13) Use the graph of $f(x) = \log x$ to obtain the graph of $g(x) = \log(x - 1)$.

Evaluate the expression:

14) $\ln \frac{1}{e^2}$ 14) _____

15) $\ln e^{5x}$ 15) _____

Use properties of logarithms to expand the logarithmic expression as much as possible.

16) $\log(10,000x)$ 16) _____

17) $\log_2 \left(\frac{2}{x} \right)$ 17) _____

18) $\ln \left(\frac{e^5}{6} \right)$ 18) _____

19) $\log_5 \sqrt[4]{y}$ 19) _____

20) $\log_3 \left(\frac{x^5}{y^6} \right)$ 20) _____

21) $\log_w \left(\frac{9x}{4} \right)$ 21) _____

22) $\log_2 \sqrt{11x}$ 22) _____

Use properties of logarithms to condense the logarithmic expression.

23) $2 \log_x 4 + \log_x 3$ 23) _____

24) $6 \ln x - \frac{1}{4} \ln y$ 24) _____

Solve the exponential equation. Use a calculator to obtain a decimal approximation, correct to two decimal places.

25) $10^x = 4.04$ 25) _____

26) $e^x = 5.6$ 26) _____

27) $7^x = 15$ 27) _____

Solve the logarithmic equation. Reject any value that is not in the domain of the original logarithmic expressions.

28) $\ln x = 5$

Solve.

29) The population of a particular country was 23 million in 1980; in 1990, it was 34 million. The exponential growth function $A = 23e^{kt}$ describes the population of this country t years after 1980. Use the fact that 10 years after 1980 the population increased by 11 million to find k to three decimal places.

30) The population of a certain country is growing at a rate of 1.4% per year. How long will it take for this country's population to double? Use the formula $t = \frac{\ln 2}{k}$, which gives the time, t , for a population with growth rate k , to double. (Round to the nearest whole year.)

Solve the problem.

31) The logistic growth function $f(t) = \frac{64,000}{1 + 1279e^{-1.7t}}$ models the number of people who have become ill with a particular infection t weeks after its initial outbreak in a particular community. How many people were ill after 9 weeks?

32) The logistic growth function $f(t) = \frac{65,000}{1 + 3249.0e^{-1.4t}}$ models the number of people who have become ill with a particular infection t weeks after its initial outbreak in a particular community. What is the limiting size of the population that becomes ill?

Rewrite the equation in terms of base e . Round to three decimal places.

33) $y = 13(5.4)^x$

33) _____

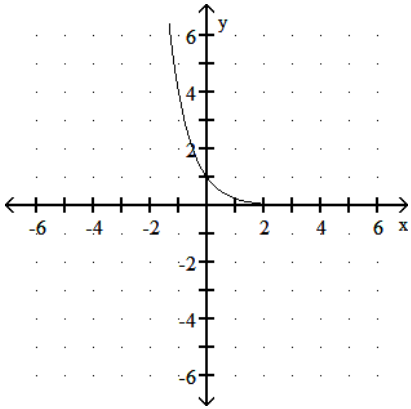
34) $y = 900(5.8)^x$

34) _____

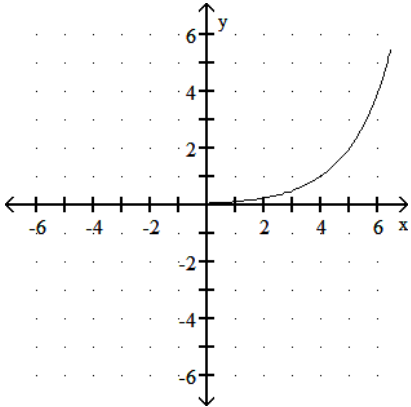
Answer Key

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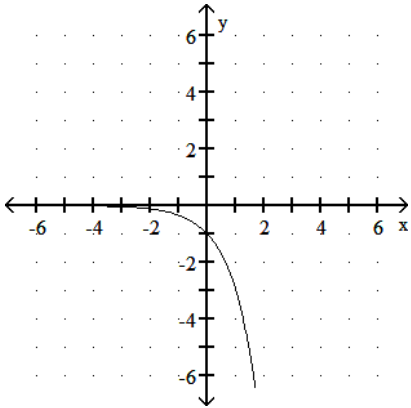
1)



2)



3)



4) \$3463.35

5) \$8262.77

6) $3^x = 9$

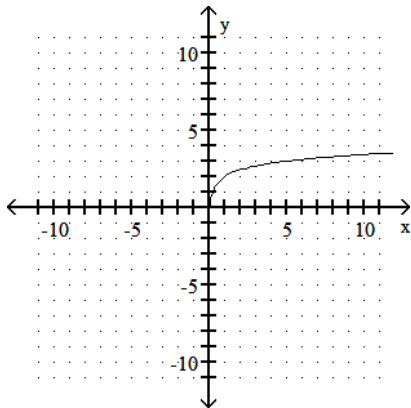
7) $\log_b 64 = 2$

8) -3

Answer Key

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9)

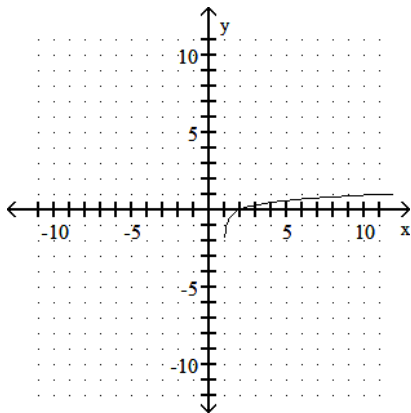


10) $(-\infty, 5)$

11) $(6, \infty)$

12) 2.19

13)



14) -2

15) $5x$

16) $4 + \log x$

17) $1 - \log_2 x$

18) $5 - \ln 6$

19) $\frac{1}{4} \log_5 y$

20) $5 \log_3 x - 6 \log_3 y$

21) $\log_w 9 + \log_w x - \log_w 4$

22) $\frac{1}{2} \log_2 11 + \frac{1}{2} \log_2 x$

23) $\log_x 48$

24) $\ln \frac{x^6}{\sqrt[4]{y}}$

25) 0.61

26) 1.72

27) 1.39

Answer Key

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28) $\{e^5\}$

29) 0.039

30) 50 years

31) 63,981 people

32) 65,000 people

33) $y = 13e^{x \ln 5.4}$, $y = 13e^{1.686x}$

34) $y = 900e^{x \ln 5.8}$, $y = 900e^{1.758x}$