

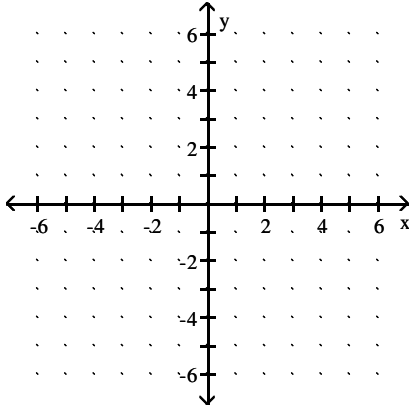
Name _____

NOTE: You must show your work to receive full credit. Simply stating the answer will not suffice.

Graph the function by making a table of coordinates.

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

1) _____

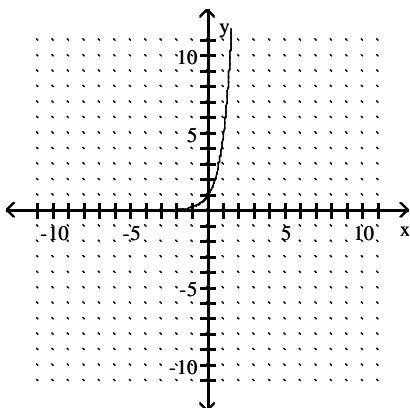


MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

The graph of an exponential function is given. Select the function for the graph from the functions listed.

2)

2) _____



A) $f(x) = 5^x + 1$

B) $f(x) = 5^x + 1$

C) $f(x) = 5^x$

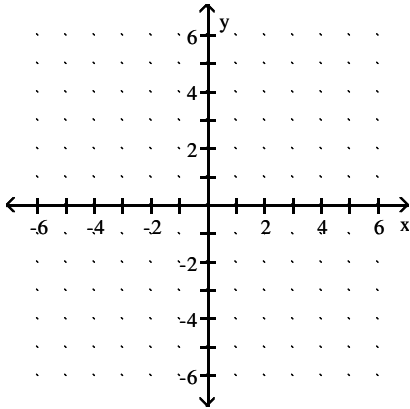
D) $f(x) = 5^x - 1$

NOTE: You must show your work to receive full credit. Simply stating the answer will not suffice.

Graph the function.

3) Use the graph of $f(x) = 5^x$ to obtain the graph of $g(x) = 5^x + 2$.

3) _____



Solve the problem.

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

4) _____

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

5) Find the accumulated value of an investment of \$19,000 at 12% compounded annually for 13 years.

5) _____

Write the equation in its equivalent exponential form.

6) $\log_5 25 = 2$

6) _____

Write the equation in its equivalent logarithmic form.

7) $6^2 = x$

7) _____

Evaluate the expression without using a calculator.

8) $\log_{10} 10,000$

8) _____

9) $\log_4 \frac{1}{16}$

9) _____

10) $\log_5 1$

10) _____

11) $2^{\log_2 18}$

11) _____

12) $\log_3 3^{14}$

12) _____

Find the domain of the logarithmic function.

13) $f(x) = \log_5 (x + 7)$

13) _____

14) $f(x) = \log_3 (x - 6)^2$

14) _____

15) $f(x) = \ln \left(\frac{1}{x - 8} \right)$

15) _____

Evaluate or simplify the expression without using a calculator.

16) $\log 0.01$

16) _____

17) $8 \log 10^{4.1}$

17) _____

18) $\ln e^3$

18) _____

19) $\ln \sqrt[7]{e}$

19) _____

20) $\ln 1$

20) _____

Evaluate the expression without using a calculator.

21) $\ln e^{12x}$

21) _____

Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

22) $\log_6 (7 \cdot 11)$

22) _____

23) $\log_4 (16x)$

23) _____

24) $\log (10,000x)$

24) _____

25) $\log_3 \left(\frac{7}{5} \right)$

25) _____

$$26) \log \left(\frac{x}{100} \right)$$

26) _____

$$27) \log_3 x^6$$

27) _____

$$28) \log_4 11^{-2}$$

28) _____

$$29) \log_d x^9$$

29) _____

$$30) \log_6 \left(\frac{7 \cdot 11}{5} \right)$$

30) _____

$$31) \log_6 \left(\frac{x^3}{y^8} \right)$$

31) _____

$$32) \log_4 \left(\frac{x+3}{x^4} \right)$$

32) _____

$$33) \ln \sqrt[6]{ey}$$

33) _____

$$34) \log_3 \left(\frac{\sqrt[7]{x} \sqrt[10]{y}}{z^2} \right)$$

34) _____

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.

$$35) \log_c m + \log_c n$$

35) _____

$$36) 6 \ln x - \frac{1}{4} \ln y$$

36) _____

$$37) \log_6 (x - 6) - \log_6 (x - 1)$$

37) _____

$$38) 3 \log_6 x + 5 \log_6 (x - 6)$$

38) _____

Use common logarithms or natural logarithms and a calculator to evaluate to four decimal places

$$39) \log_6 22$$

39) _____

$$40) \log_{18} 49.8$$

40) _____

Solve the equation by expressing each side as a power of the same base and then equating exponents.

$$41) 4^x = 64$$

41) _____

$$42) 9^x + 6 = 27^x - 5$$

42) _____

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

$$43) 2^{5x} = 2.6$$

43) _____

$$44) e^{x+5} = 2$$

44) _____

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

$$45) 10^x = 3.76$$

45) _____

$$46) e^x = 3.6$$

46) _____

$$47) 3^x = 12$$

47) _____

$$48) 7^x = 6^x + 7$$

48) _____

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.

$$49) \log_2 x = 5$$

49) _____

$$50) \log_4 (x+3) + \log_4 (x-3) = 2$$

50) _____

51) $\ln x = 5$

51) _____

52) $5 + 3 \ln x = 7$

52) _____

53) $\ln \sqrt{x+2} = 7$

53) _____

54) $\ln 4 + \ln(x-1) = 0$

54) _____

Solve.

55) The value of a particular investment follows a pattern of exponential growth. In the year 2000, you invested money in a money market account. The value of your investment t years after 2000 is given by the exponential growth model $A = 3200e^{0.06t}$. How much did you initially invest in the account?

55) _____

56) The value of a particular investment follows a pattern of exponential growth. In the year 2000, you invested money in a money market account. The value of your investment t years after 2000 is given by the exponential growth model $A = 1600e^{0.052t}$. By what percentage is the account increasing each year?

56) _____

Solve the problem.

57) The logistic growth function $f(t) = \frac{71,000}{1 + 2365.7e^{-1.2t}}$ 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 7 weeks?

57) _____

58) The logistic growth function $f(t) = \frac{440}{1 + 6.3e^{-0.27t}}$ describes the population of a species of butterflies t months after they are introduced to a non-threatening habitat. What is the limiting size of the butterfly population that the habitat will sustain? 58) _____

59) The logistic growth function $f(t) = \frac{320}{1 + 7.0e^{-0.22t}}$ 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? 59) _____

Determine whether the given ordered pair is a solution of the system.

60) $(4, 5)$ 60) _____
 $x + y = 9$
 $x - y = -1$

61) $(5, -1)$ 61) _____
 $x + y = -6$
 $x - y = -4$

Solve the system of equations by the substitution method.

62) 62) _____
 $y = 2x - 4$
 $3y + 9x = -72$

Solve the system by the addition method.

63) $4x + 7y = -10$ 63) _____
 $-4x - 11y = 18$

64) $4x + y = 1$ 64) _____
 $6x + 4y = -1$

$$\begin{aligned} 65) \quad & 5x - 6y = -28 \\ & 2x + 4y = 40 \end{aligned}$$

65) _____

Solve the system by the method of your choice. Identify systems with no solution and systems with infinitely many solutions, using set notation to express their solution sets.

$$\begin{aligned} 66) \quad & y = -2x - 4 \\ & -8x - 4y = 16 \end{aligned}$$

66) _____

$$\begin{aligned} 67) \quad & 2x - 4y = 5 \\ & -8x + 16y = -15 \end{aligned}$$

67) _____

Determine if the given ordered triple is a solution of the system.

$$\begin{aligned} 68) \quad & (4, 5, 3) \\ & x + y + z = 12 \\ & x - y + 4z = 11 \\ & 3x + y + z = 20 \end{aligned}$$

68) _____

$$\begin{aligned} 69) \quad & (-4, 4, 3) \\ & x + y + z = 3 \\ & x - y + 2z = -9 \\ & 5x + y + z = 15 \end{aligned}$$

69) _____

Solve the system of equations.

$$\begin{aligned} 70) \quad & x + y + z = 0 \\ & x - y + 4z = 17 \\ & 2x + y + z = -4 \end{aligned}$$

70) _____

Evaluate the determinant.

$$71) \quad \begin{vmatrix} -5 & 8 \\ 3 & -6 \end{vmatrix}$$

71) _____

$$72) \begin{vmatrix} 6 & 8 \\ 8 & 5 \end{vmatrix}$$

72) _____

Use Cramer's rule to solve the system.

$$73) \begin{cases} 2x + 3y = -4 \\ 5x + y = -23 \end{cases}$$

73) _____

$$74) \begin{cases} -2x - 2y = -16 \\ 2x + 3y = 23 \end{cases}$$

74) _____

Evaluate the determinant.

$$75) \begin{vmatrix} 6 & 0 & 0 \\ 6 & 8 & 9 \\ 6 & 8 & 4 \end{vmatrix}$$

75) _____

$$76) \begin{vmatrix} -4 & -4 & -2 \\ -4 & 0 & -3 \\ 5 & 0 & -5 \end{vmatrix}$$

76) _____

Use Cramer's rule to determine if the system is inconsistent system or contains dependent equations.

$$77) \begin{cases} 3x + y = 8 \\ 12x + 4y = 32 \end{cases}$$

77) _____

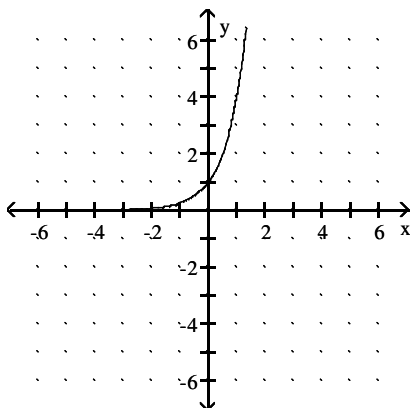
$$78) \begin{cases} 3x + 6y = 36 \\ 6x + 12y = 34 \end{cases}$$

78) _____

Answer Key

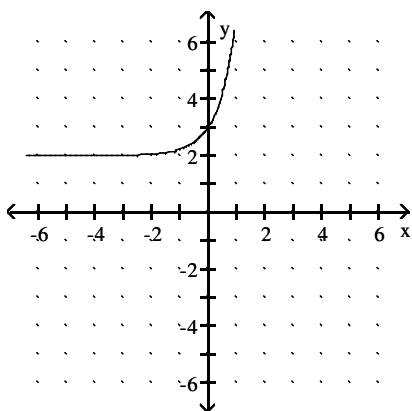
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1)



2) C

3)



4) 0.37 mg

5) \$82,906.37

6) $5^2 = 25$

7) $\log_6 x = 2$

8) 4

9) -2

10) 0

11) 18

12) 14

13) $(-7, \infty)$

14) $(-\infty, 6)$ or $(6, \infty)$

15) $(8, \infty)$

16) -2

17) 32.8

18) 3

19) $\frac{1}{7}$

20) 0

21) $12x$

22) $\log_6 7 + \log_6 11$

23) $2 + \log_4 x$

Answer Key

Testname: PATTERSON141REVIEW3-REAL

24) $4 + \log x$

25) $\log_3 7 - \log_3 5$

26) $\log x - 2$

27) $6 \log_3 x$

28) $-2 \log_4 11$

29) $9 \log_d x$

30) $\log_6 7 + \log_6 11 - \log_6 5$

31) $3 \log_6 x - 8 \log_6 y$

32) $\log_4 (x + 3) - 4 \log_4 x$

33) $\frac{1}{6} \ln y + \frac{1}{6}$

34) $\frac{1}{7} \log_3 x + \frac{1}{10} \log_3 y - 2 \log_3 z$

35) $\log_c (mn)$

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

37) $\log_6 \left(\frac{x-6}{x-1} \right)$

38) $\log_6 x^3(x-6)^5$

39) 1.7251

40) 1.3521

41) {3}

42) {27}

43) $\left\{ \frac{\ln 2.6}{5 \ln 2} \right\}$

44) { $\ln 2 - 5$ }

45) 0.58

46) 1.28

47) 2.26

48) 81.36

49) {32}

50) {5}

51) $\{e^5\}$

52) $\{e^{2/3}\}$

53) $\{e^{14} - 2\}$

54) $\{\frac{5}{4}\}$

55) \$3200.00

56) 5.2%

57) 46,346 people

58) 440 butterflies

59) 40 butterflies

60) solution

61) not a solution

62) $\{(-4, -12)\}$

Answer Key

Testname: PATTERSON141REVIEW3-REAL

63) $\{(1, -2)\}$

64) $\left\{\left\{\frac{1}{2}, -1\right\}\right\}$

65) $\{(4, 8)\}$

66) $\{(x, y) \mid 2x + y = -4\}$

67) \emptyset

68) solution

69) not a solution

70) $\{(-4, -1, 5)\}$

71) 6

72) -34

73) $\{(-5, 2)\}$

74) $\{(1, 7)\}$

75) -240

76) 140

77) system contains dependent equations

78) system is inconsistent