Guided Skills Practice

Tell whether each function represents exponential growth or exponential decay, and give the *y*-intercept. *(EXAMPLE 1)*

5. $f(x) = \left(\frac{1}{2}\right)^x$ **6.** $g(x) = 3(2)^x$ **7.** $k(x) = 5(0.5)^x$

APPLICATIONS

8. INVESTMENTS Find the final amount of a \$250 investment after 5 years at 6% interest compounded annually, quarterly, and daily. *(EXAMPLE 2)*

9. INVESTMENTS Find the effective yield for a \$2000 investment that is worth \$4000 after 15 years. *(EXAMPLE 3)*

Practice and Apply

Identify each function as linear, quadratic, or exponential.

10. $g(x) = 10x + 3$ **11.** $k(x) = (77 - x)x$ **12.** $f(x) = 12(2.5)^x$

13. $k(x) = 0.5^x - 3.5$ **14.** $g(x) = (2200)^{3.5x}$ **15.** $h(x) = 0.5x^2 + 7.5$

Tell whether each function represents exponential growth or decay.

16. $y(x) = 12(2.5)^x$ **17.** $k(x) = 500(1.5)^x$ **18.** $y(t) = 45\left(\frac{1}{4}\right)^t$

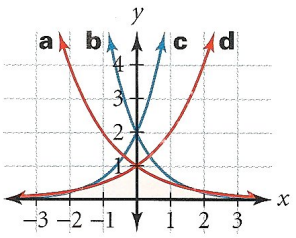
19. $d(x) = 0.125\left(\frac{1}{2}\right)^x$ **20.** $g(x) = 0.25(0.8)^x$ **21.** $s(k) = 0.5(0.5)^k$

22. $m(x) = 222(0.9)^x$ **23.** $f(k) = 722^{-k}$ **24.** $g(x) = 0.5\dot{(}787)^{-x}$

Match each function with its graph.

25. $y = 2^x$ **26.** $y = 2(3)^x$

27. $y = 2\left(\frac{1}{3}\right)^x$ **28.** $y = \left(\frac{1}{2}\right)^x$



Find the final amount for each investment.

29. \$1000 at 6% interest compounded annually for 20 years

30. \$1000 at 6% interest compounded semiannually for 20 years

31. \$750 at 10% interest compounded quarterly for 10 years

32. \$750 at 5% interest compounded quarterly for 10 years

33. \$1800 at 5.65% interest compounded daily for 3 years

34. \$1800 at 5.65% interest compounded daily for 6 years

35. Graph $f(x) = 2^x$, $g(x) = 5^x$, and $h(x) = 8^x$.
- **a.** Which function exhibits the fastest growth? the slowest growth?
- **b.** What is the *y*-intercept of each function?
- **c.** State the domain and range of each function.

36. Graph $a(x) = \left(\frac{1}{2}\right)^x$, $b(x) = \left(\frac{1}{5}\right)^x$, and $c(x) = \left(\frac{1}{8}\right)^x$.
- **a.** Which function exhibits the fastest decay? the slowest decay?
- **b.** What is the *y*-intercept of each function?
- **c.** State the domain and range of each function.

CHALLENGE

37. Describe when the graph of $f(x) = ab^x$ is a horizontal line.

CONNECTIONS

TRANSFORMATIONS **Graph each pair of functions and describe the transformations from *f* to *g*.**

38. $f(x) = \left(\frac{1}{2}\right)^x$ and $g(x) = 5\left(\frac{1}{2}\right)^x$

39. $f(x) = \left(\frac{1}{10}\right)^x$ and $g(x) = 0.5\left(\frac{1}{10}\right)^x$

40. $f(x) = 2^x$ and $g(x) = 3(2)^x + 1$

41. $f(x) = 10^x$ and $g(x) = 2(10)^x - 3$

42. $f(x) = 10^x$ and $g(x) = 3(10)^{x+2}$

43. $f(x) = 2^x$ and $g(x) = 5(2)^{x-1}$

44. $f(x) = 3\left(\frac{1}{2}\right)^x$ and $g(x) = 3(2^x)$

45. $f(x) = \left(\frac{1}{3}\right)^x$ and $g(x) = 2(3)^{-x}$

46. TRANSFORMATIONS Describe how each transformation of $f(x) = b^x$ affects the domain and range, the asymptotes, and the intercepts.

- **a.** a vertical stretch
- **b.** a vertical compression
- **c.** a horizontal translation
- **d.** a vertical translation
- **e.** a reflection across the *y*-axis

STATISTICS **Use an exponential regression equation to find the effective yield for each investment. Assume that interest is compounded only once each year.**

47 a $1000 mutual fund investment made at the beginning of 1990 that is worth $1450 at the beginning of 2000

48 a house that is bought for $75,000 at the end of 1995 and that is worth $95,000 at the end of 2005

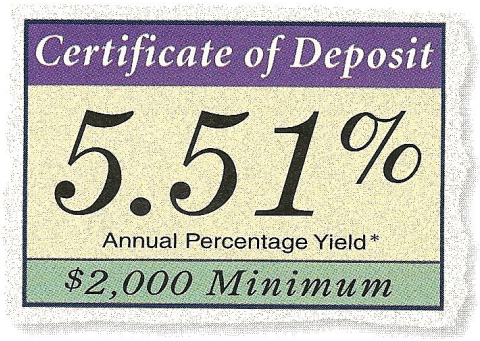
STATISTICS **Use an exponential regression equation to model the annual rate of inflation, or percent increase in price, for each item described.**

49 a half-gallon of milk cost $1.37 in 1989 and $1.48 in 1995 [*Source: U.S. Bureau of Labor Statistics*]

50 a gallon of regular unleaded gasoline cost $0.93 in 1986 and $1.11 in 1993 [*Source: U.S. Bureau of Labor Statistics*]

APPLICATIONS

51. INVESTMENTS Find the final amount of a $2000 certificate of deposit (CD) after 5 years at an annual interest rate of 5.51% compounded annually.



52. INVESTMENTS Consider a $1000 investment that is compounded annually at three different interest rates: 5%, 5.5%, and 6%.

- **a.** Write and graph a function for each interest rate over a time period from 0 to 60 years.
- **b.** Compare the graphs of the three functions.
- **c.** Compare the shapes of the graphs for the first 10 years with the shapes of the graphs between 50 and 60 years.

53. INVESTMENTS The final amount for $5000 invested for 25 years at 10% annual interest compounded semiannually is $57,337.

- **a.** What is the effect of doubling the amount invested?
- **b.** What is the effect of doubling the annual interest rate?
- **c.** What is the effect of doubling the investment period?
- **d.** Which of the above has the greatest effect on the final amount of the investment?