In Exercises 1–6, tell whether the function is an exponential growth function or exponential decay function, and find the constant percentage rate of growth or decay.

1. $P(t) = 3.5 \cdot 1.09^t$

2. $P(t) = 4.3 \cdot 1.018^t$

3. $f(x) = 78{,}963 \cdot 0.968^x$

4. $f(x) = 5607 \cdot 0.9968^x$

5. $g(t) = 247 \cdot 2^t$

6. $g(t) = 43 \cdot 0.05^t$

In Exercises 7–18, determine the exponential function that satisfies the given conditions.

7. Initial value = 5, increasing at a rate of 17% per year

8. Initial value = 52, increasing at a rate of 2.3% per day

9. Initial value = 16, decreasing at a rate of 50% per month

10. Initial value = 5, decreasing at a rate of 0.59% per week

11. Initial population = 28,900, decreasing at a rate of 2.6% per year

12. Initial population = 502,000, increasing at a rate of 1.7% per year

13. Initial height = 18 cm, growing at a rate of 5.2% per week

14. Initial mass = 15 g, decreasing at a rate of 4.6% per day

30. Exponential Growth The 2000 population of Las Vegas, Nevada was 478,000 and is increasing at the rate of 6.28% each year. At that rate, when will the population be 1 million?

34. Radioactive Decay The half-life of a certain radioactive substance is 65 days. There are 3.5 g present initially.

(a) Express the amount of substance remaining as a function of time t.

(b) When will there be less than 1 g remaining?

40. Radiocarbon Dating The amount C in grams of carbon-14 present in a certain substance after t years is given by

$$C = 20e^{-0.0001216t}.$$

Estimate the half-life of carbon-14.

42. Atmospheric Pressure Find the altitude above sea level at which the atmospheric pressure is 2.5 lb/in.^{2}.

43. Population Modeling Use the 1950–2000 data in Table 3.12 and exponential regression to predict Los Angeles's population for 2003. Compare the result with the listed value for 2003.

44. Population Modeling Use the 1950–2000 data in Table 3.12 and exponential regression to predict Phoenix's population for 2003. Compare the result with the listed value for 2003. Repeat these steps using 1960–2000 data to create the model.

Table 3.12 Populations of Two U.S. Cities (in thousands)

Year	Los Angeles	Phoenix
1950	1970	107
1960	2479	439
1970	2812	584
1980	2969	790
1990	3485	983
2000	3695	1321
2003	3820	1388

45. Spread of Flu The number of students infected with flu at Springfield High School after t days is modeled by the function

$$P(t) = \frac{800}{1 + 49e^{-0.2t}}.$$

(a) What was the initial number of infected students?

(b) When will the number of infected students be 200?

(c) The school will close when 300 of the 800-student body are infected. When will the school close?

46. Population of Deer The population of deer after t years in Cedar State Park is modeled by the function

$$P(t) = \frac{1001}{1 + 90e^{-0.2t}}.$$

(a) What was the initial population of deer?

(b) When will the number of deer be 600?

(c) What is the maximum number of deer possible in the park?