



10. **Geography** The table shows the population  $P(t)$  (in thousands) for a small mythical nation at various times.

|            |      |      |      |      |      |      |      |
|------------|------|------|------|------|------|------|------|
| $t$ (year) | 1825 | 1850 | 1875 | 1900 | 1925 | 1950 | 1975 |
| $P(t)$     | 200  | 252  | 318  | 401  | 504  | 635  | 800  |

- a. Does it appear that this population is growing exponentially?  
 b. About how long does it take for the population to double?  
 c. Find an equation for  $P(t)$ . (*Hint:* The exponent contains  $t - 1825$ .)
11. **Business** The value of a car  $t$  years from now is given by  $V(t) = 4000(0.85)^t$ .
- a. What is the annual rate of depreciation?  
 b. In how many years will the value of the car be about half what it is now?
12. a. **Geography** Suppose the population of a nation grows at 3% per year. If the population was 30,000,000 people in 1990, what will be the population, to the nearest million, in the year 2000?  
 b. According to the rule of 72, how long does it take for the population to double?
13. a. **Finance** If \$1000 is invested so that it grows at the rate of 10% per year, what will the investment be worth in 20 years?  
 b. According to the rule of 72, in approximately how many years will the investment double in value?
14. **Biology** A bacteria colony triples every 4 days. The population is  $P_0$  bacteria. What will the population  $P(t)$  be  $t$  days later?
15. **Consumer Economics** If the price of sneakers increases 6% per year, about how long will it take for the price to double?
16. **Medicine** When a certain medicine enters the blood stream, it gradually dilutes, decreasing exponentially with a half-life of 3 days. The initial amount of the medicine in the blood stream is  $A_0$  milliliters. What will the amount be 30 days later?
17. **Medicine** An amount  $A_0$  of radioactive iodine has a half-life of 8.1 days. In terms of  $A_0$ , how much is present after 5 days? (Radioactive iodine is used to evaluate the health of the thyroid gland.)
18. a. Let  $f(x) = 2^x$ . Complete the table.

|        |    |    |   |   |   |
|--------|----|----|---|---|---|
| $x$    | -2 | -1 | 0 | 1 | 2 |
| $f(x)$ | ?  | ?  | ? | ? | ? |

- b. Graph the function by plotting points.

