

1. The population of Smallville, USA, was 30,000 at the start of the year 2003. Assume that the population of the town decreases at the rate of 5% per year.
  - a. Find the population at the start of 2004.
  - b. Find a function,  $P(t)$ , that gives the population  $t$  years after the start of 2003.
  - c. Predict the population at the start of the year 2010.
  - d. Find the population at the start of 2001.
  - e. How long does it take the population to decline to 15,000?
2. The population of a colony of bacteria increases by 30% every hour. At 2:00pm the population is 10,000.
  - a. Find the population,  $P(t)$ , at time  $t$  hours after 2:00pm.
  - b. Find the population at 6:30pm.
  - c. What was the population at 12:15pm?
  - d. How long does it take the population to double?
3. A colony of bacteria grows exponentially. At 2:00pm the population is 20,000 and at 3:00pm the population is 60,000.
  - a. Find the population at 2:30pm.
  - b. When is the population 40,000?
4. A colony of bacteria grows exponentially. At 2:00pm the population is 20,000 and at 6:00pm the population is 80,000.
  - a. Find the population at 4:00pm.
  - b. When is the population 50,000?
5. You invest \$10,000 at an annual rate of 6%, compounded monthly.
  - a. Find the value of your investment after 10 years.
  - b. How long does it take your investment to double?
  - c. How much interest do you earn during the fifth year of your investment?
6. You invest \$50,000 at an annual rate of 4%, compounded quarterly. How long does it take your investment to triple in value?
7. You invest \$50,000 at an annual rate of 4%, compounded monthly.
  - a. How much interest do you earn on your investment during the 10th year? During the 20th year?
  - b. By what percent did your investment grow during the 10th year? During the 20th year?
- 8a. How much money do you need to invest now at an annual rate of 4%, compounded annually, to have \$100,000 in 40 years?
  - b. How much money do you need to invest now at an annual rate of 4%, compounded quarterly, to have \$100,000 in 40 years?
  - c. Repeat parts a) and b) at an annual rate of 5%.
9. If a \$10,000 investment grows to \$14,000 in 4 years, determine the average annual interest rate the investment earned. Assume interest is compounded yearly.