1. **Typing Speed**   In typing class, the average number of words per minute N typed after t weeks of lessons was found to be modeled by $N = \dfrac{158}{1 + 5.4e^{-0.12t}}$. Find the numbers of weeks necessary to type:

   (a) 50 words per minute

   (b) 75 words per minute

2. A deposit of $10,000 is made in a savings account for which the interest is compounded continuously. The balance will double in 12 years.

   (a) What is the annual interest rate for this account?

   (b) Find the balance after 1 year.

3. **Sales**   The sales S (in thousands of units) of a cleaning solution after x hundred dollars is spent on advertising and is given by the equation $S = 10(1 - e^{kx})$. When $500 is spent on advertising, 2500 units are sold.

   (a) Complete the model by solving for k

   (b) Estimate the number of units that will be sold if advertising expenditures are raised to $700.

4. **Population**   The populations P (in thousands) of Cameron County, Texas, from 2006 through 2012 can be modeled by $P = 339.2e^{kt}$ where t is the year, with t = 6 corresponding to 2006. In 2011, the population was 412,600.

   (a) Find the value of k for the model. Round your answer to four decimal places.

   (b) Use your model to predict the population in 2018.

5. **Demography**   The populations P (in thousands) of Antioch, California, from 2006 through 2012 can be modeled by $P = 90e^{0.013t}$, where t is the year, with t = 6 corresponding to 2006.

   (a) According to the model, was the population of Antioch increasing or decreasing from 2006 through 2012?

   (b) What were the populations of Antioch in 2006, 2009, and 2012?

   (c) According to the model, when will the population of Antioch be approximately 116,000?

Answer Key

1. (a) about 7.6 weeks   (b) about 13.2 weeks

2. (a) about 5.7%   (b) about $10,694.63

3. (a) $k \approx -0.0575$ (b) about 3,320 units

4. (a) $k \approx 0.0178$ (b) about 467,300 when t = 18

5. (a) Increasing   (b) 2006: 97,300   2009: 101,200   2012: 105,200

   (c) in the year 2019