

**11-3**

NAME \_\_\_\_\_ DATE \_\_\_\_\_ PERIOD \_\_\_\_\_

**Practice**

**The Number  $e$**

1. **Demographics** In 1995, the population of Kalamazoo, Michigan, was 79,089. This figure represented a 0.4% annual decline from 1990.
  - a. Let  $t$  be the number of years since 1995 and write a function that models the population in Kalamazoo in 1995.  
 $y = 79,089e^{-0.004t}$
  - b. Predict the population in 2010 and 2015. Assume a steady rate of decline. **2010: 74,483; 2015: 73,008**
2. **Biology** Suppose a certain type of bacteria reproduces according to the model  $P(t) = 100e^{0.271t}$ , where  $t$  is time in hours.
  - a. At what rate does this type of bacteria reproduce?  
**27.1%**
  - b. What was the initial number of bacteria?  
**100**
  - c. Find the number of bacteria at  $P(5)$ ,  $P(10)$ ,  $P(24)$ , and  $P(72)$ . Round to the nearest whole number.  
 **$P(5)$ : 388**  
 **$P(10)$ : 1503**  
 **$P(24)$ : 66,781**  
 **$P(72)$ : 29,782,004,910**
3. **Finance** Suppose Karyn deposits \$1500 in a savings account that earns 6.75% interest compounded continuously. She plans to withdraw the money in 6 years to make a \$2500 down payment on a car. Will there be enough funds in Karyn's account in 6 years to meet her goal?  
**No. Karyn will have \$2249 in her account in 6 years. She will be \$251 short.**
4. **Banking** Given the original principal, the annual interest rate, the amount of time for each investment, and the type of compounded interest, find the amount at the end of the investment.
  - a.  $P = \$1250$ ,  $r = 8.5\%$ ,  $t = 3$  years, semiannually  
**\$1604.60**
  - b.  $P = \$2575$ ,  $r = 6.25\%$ ,  $t = 5$  years 3 months, continuously  
**\$3575.03**

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**Approx**

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9. Which  
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10. The ex  
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