11-3

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.

   b. Predict the population in 2010 and 2015. Assume a steady rate of decline.

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?

   b. What was the initial number of bacteria?

   c. Find the number of bacteria at $P(5)$, $P(10)$, $P(24)$, and $P(72)$. Round to the nearest whole number.

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?

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

   b. $P = \$2575$, $r = 6.25\%$, $t = 5$ years 3 months, continuously