

Practice the following problems related to exponential decay models.

### Key Formulas

$$A(t) = P_0 e^{-rt} \quad \text{and} \quad A(t) = P_0 e^{rt}$$

- 36. Present value.** Desmond wants to have \$15,000 available in 5 yr to pay for new siding. Interest is 4.3%, compounded continuously. How much money should be invested?

**36. \$12,098.12**

The formula used to get the answer is of the following form

$$A(t) = P_0 e^{0.043t}$$

Plugging the  $(A, t) = (15000, 5)$  to the above model formula to solve for  $P_0$

$$15000 = P_0 e^{0.043 \times 5}$$

Therefore

$$P_0 = \frac{15000}{e^{0.043 \times 5}} \approx 12098$$

- 44. Depreciation.** The Larsons purchase a motorboat and estimate that its value  $V(t)$ , in dollars, after  $t$  years, is given by

$$V(t) = 30,000e^{-0.27t}.$$

- a) What did the motorboat cost originally?
- b) What is the motorboat's value after 6 yr?
- c) Find the rate of change of the motorboat's value after 6 yr, and explain its meaning.

**44. (a) \$30,000; (b) \$5936.96; (c) left to the student**

- 50. Decline in beef consumption.** Annual consumption of beef per person was about 64.6 lb in 2000 and about 61.2 lb in 2008. Assuming that  $B(t)$ , the annual beef consumption  $t$  years after 2000, is decreasing according to the exponential decay model:
- a) Find the value of  $k$ , and write the equation.
  - b) Estimate the consumption of beef in 2015.
  - c) In what year (theoretically) will the consumption of beef be 20 lb per person?

“Decline” implies decay.  $A(t) = P_0 e^{-kt}$

**50. (a)**  $B(t) = 64.6e^{-0.0068t}$ ; **(b)** 58.3 lb; **(c)** 2172