Practice the following problems related to general exponential and logarithmic functions.

Section 2.6

1. Find the derivative of the following functions

22. $y = 4^{x^2+5}$

22. $2x \cdot \ln 4 \cdot 4^{x^2+5}$

32. $y = 8\log_3(2x - x^3)$

32. $\dfrac{16 - 24x^2}{(2x - x^3)\ln 3}$

40. $y = \dfrac{3x + 2}{\log_6 x}$

40. $\dfrac{3\log_6 x - \dfrac{3x + 2}{x \ln 6}}{(\log_6 x)^2}$

2. Applications

50. Recycling aluminum cans. It is known that 49.4% of all aluminum cans distributed are recycled each year. A beverage company uses 250,000 lb of aluminum cans. After recycling, the amount of aluminum, in pounds, still in use after t years is given by

$$N(t) = 250{,}000(0.494)^t.$$

(*Source:* aluminum.org, 2017.)

a) Find $N(3)$, and explain its meaning.
b) Find $N'(3)$, and explain its meaning.
c) When will 10% of the original amount of aluminum still be in use?

50. (a) After 3 yr, there are 30,138.45 lb still is use; **(b)** after 3 yr, the amount in use is changing by $-21{,}254$ lb/yr;

60. Growth of an investment. Suppose $A(t) = 2500e^{0.0255t}$ gives the amount, $A(t)$, in Jerry's account t years after his original investment.

a) Rewrite the function in the form $P(t) = 2500 \cdot 3^{t/T}$.
b) Rewrite the function in the form $P(t) = 2500 \cdot 9^{t/T}$.
c) How do the two T values in parts (a) and (b) compare?
d) Without using a calculator, find T if the model is written as $P(t) = 2500 \cdot 27^{t/T}$.

60. (a) $A(t) = 2500 \cdot 3^{t/43.0828}$; **(b)** $A(t) = 2500 \cdot 9^{t/86.1657}$; **(c)** with base 9, the value of T is double that with base 3;
(d) 129.2484