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

Section 2.5

1. Find the derivative of the following functions

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

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

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

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?

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 $P(t) = 2500 \cdot 27^{t/T}$.