

Name: \_\_\_\_\_

**For full credit, show all work.**

1. (10 points) The number of people that have heard a rumor after  $t$  hours is

$$N(t) = \frac{10,200}{1 + 50e^{-0.42t}}$$

How long does it take for 10,000 people to have heard the rumor?

2. (10 points = 3+4+3) A company has started a new advertising campaign to increase the sales. It is expected that  $t$  years after the start of the campaign, the yearly sales will be given by

$$N = 10,000(0.6)^{0.3t}$$

- (a) What are the sales when the advertising campaign begins?

- (b) What are the maximum predicted sales?

- (c) What are the predicted sales after 2 years?

3. (10 points) What size payments must be put into an account at the end of each quarter to establish an ordinary annuity that has a future value of \$50,000 in 14 years, if the investment pays 12%, compounded quarterly?

4. (10 points) Find the interest that will result if \$8,000 is invested at 7%, compounded continuously, for 8 years.

5. (10 points) Sean Lee purchases \$20,000 worth of supplies for his restaurant by making a \$3000 down payment and amortizing the rest with quarterly payments over the next 5 years. Find the size of quarterly payments if the interest rate of the debt is 16%, compounded quarterly.

6. (Bonus: 10 points) Evaluate each logarithm by using properties of logarithms and the following facts:

$$\log_a x = -3.4 \quad \log_a y = 2.1$$

(a)  $\log_a (x^2 y^2)$

(b)  $\log_a \left( \frac{\sqrt[4]{x}}{y} \right)$

(c)  $\log_{\sqrt[3]{a}} x + 4$