Name

# 8-3 Modeling with Exponential Functions

### Part 1: Determine the exponential function that models the situation.

1. Initial value = 5, increasing at a rate of 17% per year.

2. Initial value = \$4000, decreasing at a rate of 5.5% per year.

#### Part 2: Growth and Decay problems—Write the function that represents the situation, then answer the question.

3. The 2000 population of Lehi was 26,000, and was increasing at a rate of 8.5% per year. Predict the population of Lehi in 2015. When will the population reach 100,000?

4. The half-life of Strontium-90 is 28.8 years. How long will it take a 10 gram sample to decay to 1 gram?

5. The George River herd of caribou in Canada was estimated to be about 4,700 in 1954 and grew at an exponential rate. In the exponential growth function  $P(t) = P_0 e^{0.154t}$ ,  $P_0$  is the initial population in 1954, *t* is the time in years after 1954, and P(t) is the population at time *t*. Use the function to determine how many years after 1954 it will take the herd to reach 400,000.

#### Part 3: Money—Write the function that represents the situation, then answer the question.

6. If Hugh invests \$1500 at 4% compounded annually, how much money will he have after 7 years?

7. If Bob invests \$2400 at 3.6% compounded annually, how long will it take him to double his money?

8. How much money will you have after 6 years if you invest \$1000 at 5% interest compounded continuously?

**9. Explain the Error** A student has a baseball card that is worth \$6.35. He looks up the appreciation rate and finds it to be 2.5% per year. He wants to find how much it will be worth after 3 years. He writes the function  $f(t) = 6.35(2.5)^t$  and uses the graph of that function to find the value of the card in 3 years.





According to his graph, his card will be worth about \$99.22 in 3 years. What did the student do wrong? What is the correct answer?

## Review

Find any holes, asymptotes, and intercepts and state the end behavior. Then sketch a graph.

1. 
$$f(x) = \frac{x^2 - 4}{x^2 + 2x - 3}$$





2. 
$$g(x) = \frac{x^2 - 5x - 6}{x^2 - 1}$$