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## 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 $P(t)=P_{0} e^{0.154 t}, P_{0}$ 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. $f(x)=\frac{x^{2}-4}{x^{2}+2 x-3}$

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

