Chapter 7 sections 1 and 2
Exponential Growth and Decay
Show your work!

1. Describe the similarities and differences in the following equations.
   
   A) \[2000 (1.05)^{12}\]
   
   B) \[2000 (0.85)^{12}\]

   Exponential growth occurs when __________________________________________________________________________

   Exponential decay occurs when __________________________________________________________________________

Practice Problems:

1. Suppose a radioactive substance loses \(\frac{1}{3}\) of its remaining mass each second. How much of a 36 gram sample will remain after 6 seconds?

2. Each year an automobile depreciates in value by 25%. Find the value after 5 years of a car which cost $27,000 new.

3. Mr. Vernon bought $2,000 worth of stock that has been growing at the rate of 2.5% a year. What will the value of his stocks be in 10 years?

4. A 6" by 4" drawing is reduced three times using a photocopy machine. Each time it is reduced to 90% of its previous dimensions. What is its final size?

5. A student must learn 100 vocabulary words for the spelling bee. Each night the student expects to forget 20% of the words known the day before. If the student learns the words on Thursday and the test is delayed from Friday to Monday, how many words can he expect to remember on Monday?
6. Suppose Stoney Creek has 2300 students and the number of students is decreasing by 3% each year. If this rate continues, how many students will Stoney Creek have 6 years from now?

7. In 2003, the national debt was estimated at 1.4 trillion dollars. Suppose the national debt has been growing by 3% every year. What should the deficit be today?

8. Today, the Johnsonville Lumber Company has 18,000 acres of trees available for lumber. They are cutting trees at a faster rate than they are replacing them. As a result, they estimate that each year they will have 17% fewer acres of trees available for lumber. How many acres of trees will be available for lumber after 15 years?

If after the 15 years, the company stops harvesting the trees and lets the trees reforest the acreage at a rate of 6% a year. How many acres of trees will they have after 8 years?

9. The enrollment of a certain college is increasing at the rate of 2% a year. If there are currently 1752 students, how many will there be in 10 years?

10. Robert buys 6 guppies. Every 3 months his guppy population doubles.

   a. How many guppies will he have after 6 months?

   b. How many guppies will he have after 2 years?

11. Suppose a radioactive substance loses \( \frac{1}{5} \) of its remaining mass every 5 seconds. How much of a 50 gram sample will remain after 2 minutes?
12. The number of students who have applied for Internet privileges at school has doubled each month.
   a. What is the percent of increase each month?

   b. Ten students had applied for Internet privileges initially. Write a function that models the number of students applying for Internet privileges over time.

   c. How many students will have applied for Internet privileges in 4 months?

13. You invest $5,000 into an account that pays 3.16% annual interest. Find the balance of the account after 1 year if the interest is compounded with the given frequency.
   a) quarterly

   b) Monthly

   c) daily

14. You invest $1,000 into an account that pays 2.95% annual interest. Find the balance of the account after 1 year if the interest is compounded with the given frequency.

   a) Semi-annually

   b) Monthly

   c) Quarterly

15. Tell whether the graph is growth or decay.

   a. [Graph image]

   b. [Graph image]

16. Identify the domain and range for each graph in number 15.
For 17 - 21  
A) Tell if the following situations describe are:
  a. Exponential Growth
  b. Exponential Decay
B) Then write the equation for the situation.

17. Crittenton Hospital treats 3,800 patients with heart disease each year.
   Every year there are 5% fewer patients with the disease.

18. With better techniques, Michigan farmers are able to increase
    their output 3% each year. Their current output is 5 tons of
    corn each year.

19. Suppose an experiment begins with 500 bacteria and doubles every
    hour.

20. The US Postal Service delivers 27 million pieces of mail every day.
    The amount of mail increases by 5% per year

21. Each month the number of accidents is reduced by 2% in the
    city of Rochester. Last year there were 346 accidents.

Review: (h,k) concept

Consider the graph of \( y = x^2 \)
22. Sketch a graph of the following equations:

   a) \( y = (x-1)^2 \)
   b) \( y = (x+2)^2 \)
   c) \( y = x^2 - 1 \)
   d) \( y = x^2 + 2 \)
   e) \( y = (x-1)^2 + 2 \)
   f) \( y = (x+2)^2 - 1 \)

23. Therefore...
If the graph of \( y = 3^x \) is
Sketch the following
\( y = 3^{x-1} \)
\( y = 3^x + 2 \)