 Name: _____

4REV.1 ~ Lessons 4.1 & 4.2

Past due on: _____ Period: _____

Find the growth factor or decay factor.

1. A city's population increases by 17% each year.
2. A rain forest shrinks in size by 8.5% each year.
3. Water usage is lowered by 0.7% daily.
4. The polar ice caps melt by approximately 4% each decade.
5. Radioactive material is increasing by 0.62% per month.

Problems 6 – 12: Use the following functions.

$G(t) = 1500(0.98)^t$ $P(x) = 17(1.143)^x$ $T(x) = 320(1.025)^x$

$A(n) = 19.75(0.86)^n$ $C(x) = 490(0.975)^x$ $W(t) = 1.025(2.30)^t$

6. What is the initial value of $C(x)$?
7. What is the decay rate of $A(n)$?
8. What is the growth rate of $T(x)$?
9. Which functions are decreasing?
10. Which function is decaying fastest?
11. Which function has the greatest initial value?
12. Which function increases at the greatest rate of growth?

Identify the function as linear or exponential. Write a function equation of the form $y = mx + b$ if linear and $y = a(b)^x$ if exponential.

13.

x	y
1	18
2	12.8
3	7.6
4	2.4

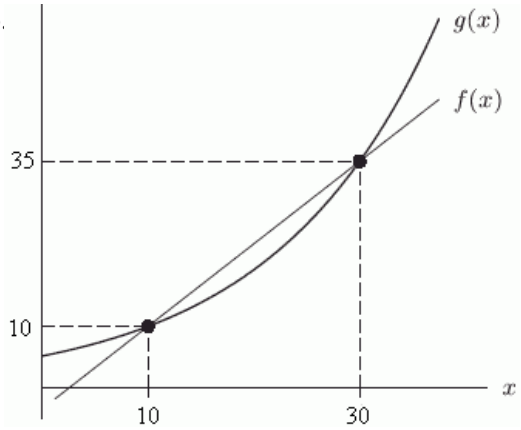
14.

x	y
1	14
2	19.6
3	27.44
4	38.416

Problems 15 & 16: Write a linear function of the form $y = mx + b$ AND write an exponential function of the form $y = a(b)^x$. If necessary, round m, b & a to 2 decimal places; round b to 3 decimal places.

15. $f(5) = 22$ and $f(25) = 6$

16.



17. Halloween Town currently has 600 residents at $t = 0$, with t in years.
    a. If the population grows by 80 creatures each year, find the appropriate function formula for the population, P, at time t.

    b. If the population grows by 8% each year, find the appropriate function formula for the population, P, at time t.

Problems 18 – 22: Model the data with an exponential function and answer the given questions.
Round values of a to 1 decimal place and change factors, b, to 3 decimal places.

18. According to the World Health organization, the population of the United States was 298.2 million in 2005. Between 1994 and 2004, the population grew at an average rate of 0.9% annually.
    a. Model the U.S. population, $P(t)$, as a function of the years since 2005, t.

    b. Assuming the percentage growth rate remains the same, what is the population today?

19. Between 1960 and 2004, the total national expenditure on health costs increased by roughly 10.1% annually. In 1960, national health expenditures were $28 billion.
    a. Model the national health expenditures, $E(t)$, as a function of the years since 1960, t.

    b. Assuming the percentage growth rate remains the same, what was the national health expenditure in 2004?

20. A typical can of Mountain Dew contains 170 milligrams of caffeine. Each hour 14.5% of the amount of caffeine in the body is metabolized and eliminated.
    a. Model the amount of caffeine in the body, $C(t)$, as a function of the time, t.

    b. How much caffeine remains in the body after 3 hours?

21. In 1985, the average NBA salary was $325 thousand and in 1998 it was $2600 thousand.
    a. Model the average NBA salary, $S(t)$, as a function of the years since 1980, t.

    b. What is the growth rate?

22. In 1982 there were 986.8 million acres of farmland in the United States. By 1997, it had decreased to 931.8 million acres.
    a. Model the amount of farmland, $A(t)$, as a function of the years since 1980, t.

    b. What is the decay rate?