HW 9-9

1. $h(t) = 350{,}000(1.02)^t$ $h(10) = \$426648.05$

2. $v(t) = 20000(.90)^t$ $v(10) = \$7000$

3. a. \$21,226
   b. \$21612
   c. \$21701
   d. \$21745

4. a

5. b

6. b

7. 7/4 or 15/4

Name_____ Alg 2 HW 9-9

1. The price of a new home is $350,000. The value of the home appreciates 2% each year.
   a. Write a function to represent the value of the home, h, after t years.
   b. How much will the home be worth in 10 years?

a. $h(t) = 350{,}000(1.02)^t$

b. $h(10) = 350{,}000(1.02)^{10} = \$426{,}648.05$

2. A car that was originally worth $20,000 depreciates at a rate of 10% per year.
   a. Write a function to represent the value of the car, v, after t years.
   b. What is the value of the car after 10 years, to the nearest thousand dollars?

a. $v(t) = 20000(.90)^t$

b. $v(10) = 20000(.9)^{10} = \$7000$

3. You have $8000 to put in a savings account that earns 5% interest. Leaving the money untouched, find the total amount, to the nearest dollar, you will have after 20 years if the interest is compounded

a. Annually?

$f(20) = 8000(1.05)^{20} = \$21,226$

b. Quarterly? $f(20) = 8000\left(1 + \frac{.05}{4}\right)^{20(4)} = \$21,612$

c. Monthly? $f(20) = 8000\left(1 + \frac{.05}{12}\right)^{20(12)} = \$21,701$

d. Daily? $f(20) = 8000\left(1 + \frac{.05}{365}\right)^{20(365)} = \$21745$

4. Which of the following best describes the graph of $f(x) = \left(\frac{1}{5}\right)^{-x}$ $\Rightarrow f(x) = 5^x$

a. It is an increasing function, and it approaches but never reaches the horizontal axis to the left of the origin.

b. It is an increasing function, and it approaches but never reaches the horizontal axis to the right of the origin.

c. It is a decreasing function, and it approaches but never reaches the horizontal axis to the left of the origin.

d. It is a decreasing function, and it approaches but never reaches the horizontal axis to the right of the origin

5. Which statement concerning the graph of the exponential function $y = 5^x$ is true?

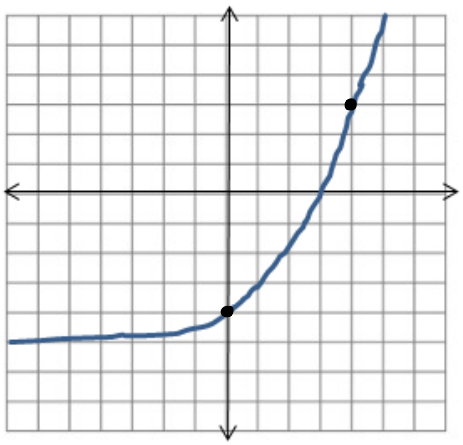
a. The graph never intersects the graph of $y = 2^x$.

b. The graph passes through the point (0,1).

c. For $x < 0$, the graph can dip below the x-axis.

d. As x increases, the graph gets closer to the x-axis.

6. Brad sketches the graph of the exponential function f(x).



Which exponential function could generate a graph of this form?

a. $f(x) = 2^x$

b. $f(x) = 2^x - 5$

c. $f(x) = 2^x + 5$

d. $f(x) = 5 \cdot 2^x$

7. Using the ~~graph in question 8~~ fxn in Q6, find the rate of change over the interval $0 \leq x \leq 4$

$$\frac{3-(-4)}{4-0} = \frac{7}{4}$$

or

$f(0) = 2^0 - 5 = -4$

$f(4) = 2^4 - 5 = 11$

$$\frac{11+4}{4-1} = 15/4$$

Applications of Exponential Growth and Decay

Applications of Exponential Growth and Decay Unit 9 Day 10

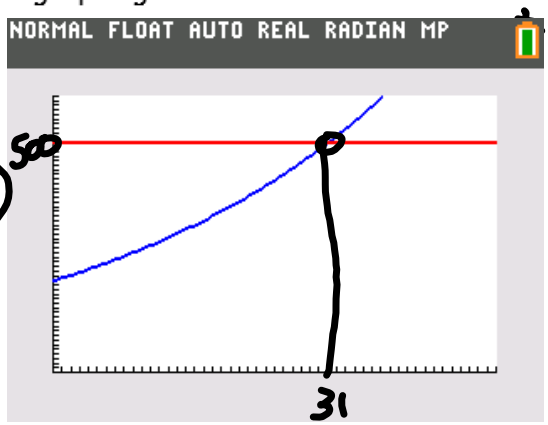
Warm-up:

Imagine we have a population of animals that grows by 3% per year. We release 200 of these animals into a wilderness preserve. How long would it take for the population to grow to 500 animals? Create a function and use your graphing calculator to evaluate.

$A(t) = 200(1.03)^t$

Window
x-min 0
x-max 50
y-min 0
y-max 600

~31 yrs



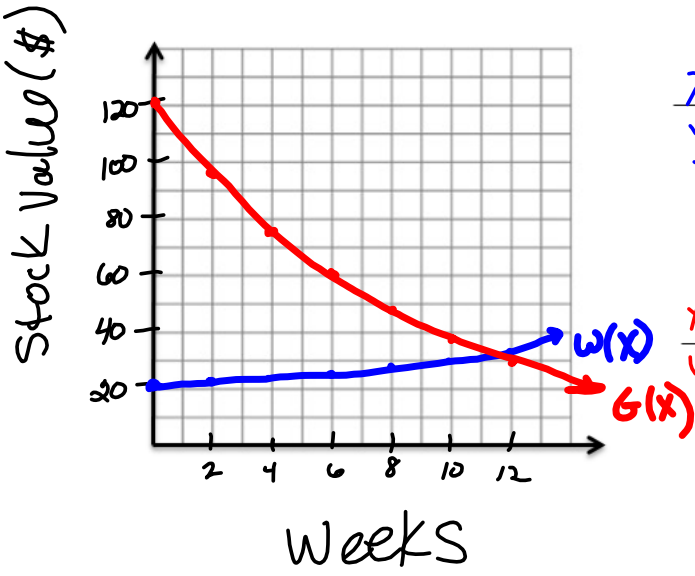
The stock price of Windpower Inc. is increasing at a rate of 4% per week. Its initial value was $20 per share. On the other hand, the stock price in Gerbil Energy is crashing (losing value) at a rate of 11% per week. If its price was $120 per share when Windpower was at $20, after how many weeks will the stock prices be the same? Model both stock prices using exponential functions. Then, find when the stock prices will be equal graphically. Draw a well-labeled graph to justify your solution.

11.5 weeks

Write a function for the stock price of each company:

Windpower Inc.: $W(x) =$ $20(1.04)^x$

Gerbil Energy: $G(x) =$ $120(.89)^x$



Windpower Inc

x	0	2	4	6	8	10	12
y	20	21.6	23.4	25.3	27.3	29.6	32

Gerbil Energy

x	0	2	4	6	8	10	12
y	120	95.1	75.3	59.6	47.2	37.4	29.6

How many weeks will it take for the stock price of Windpower Inc. to be $120/per share?

wks 45-46
(Per table)

How many weeks will it take for the stock price of Gerbil Energy to be $20/per share?

wks 15-16
(Per table)

To the nearest week, when will the stock prices be the same?

Window
x-min 0
x-max 12+
y-min 0
y-max 120

11.5 → 12 weeks

Let us say that Windpower Inc. stock in 2010 was $25 per share. The company was extremely successful and their stock price was $105 in 2015. Assuming exponential growth, approximate the annual growth rate, to the *nearest percent*.

$$A(t) = a(1 \pm r)^t$$

$$\frac{105}{25} = \frac{25(1+r)^5}{25}$$

$$(4.2)^{1/5} = ((1+r)^5)^{1/5}$$

$$1.332 = 1 + r$$

$$.332 = r$$

$$\times 100$$

$$33\%$$