Name: _____   **Date:** _____

Lesson 5 Practice Problems

Section 5.1: Linear Functions vs. Exponential Functions

1. Complete the table below.

Function	Linear or Exponential?	Linear: Increasing or Decreasing? Exponential: Growth or Decay?	Linear: find the slope Exponential: find the base	Identify the Vertical Intercept as an Ordered Pair.
$y = 2x + 4$	Linear	Increasing	Slope $= 2$	(0,4)
$f(x) = 3(2)^x$				
$g(x) = -1.5x - 2$				
$p(t) = 100(1.2)^t$				
$f(c) = 1.8c + 32$				
$g(x) = 1000(0.75)^x$				

2. For the following three linear functions, identify the vertical intercept, calculate the slope and then write the equation for the function in $f(x) = mx + b$ form.
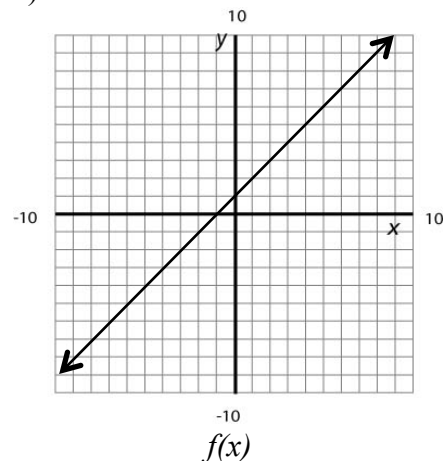
a)

x	f(x)
-1	3
0	2
1	1

b)

$f(x) = \{(-2,2), (0,3), (2,4)\}$

c)

f(x)

3. For the following three exponential functions, identify the initial value (a), calculate the base (b), and then write the equation for the function in $f(x) = ab^x$ form.
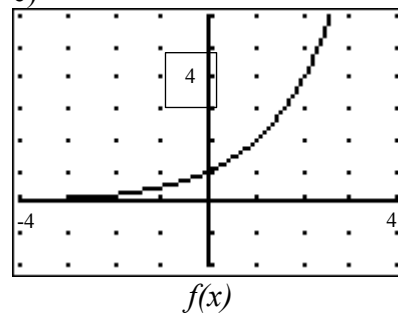
a)

x	f(x)
0	4
1	8
2	16

b)

$f(x) = \{(0, 2), (1, 4.2), (2, 8.82)\}$

c)

f(x)

4. Determine if each data set is linear or exponential, and write the formula for each. Show complete work.

a)

x	−2	−1	0	1	2	3	4
$f(x)$	.04	.2	1	5	25	125	625

b)

x	−2	−1	0	1	2	3	4
$f(x)$	−1.375	−.5	.375	1.25	2.125	3	3.875

c)

x	−2	−1	0	1	2	3	4
$f(x)$	−3	−5.5	−8	−10.5	−13	−15.5	−18

d)

x	−2	−1	0	1	2	3	4
$f(x)$	98.224	99.108	100	100.9	101.81	102.72	103.65

e)

x	0	1	2	3	4	5	6
$f(x)$	2	4	8	16	32	64	128

Section 5.2: Characteristics of Exponential Functions

5. Complete the table below for each exponential function.

	$f(x) = 3.4(1.13)^x$	$g(x) = 42(0.62)^x$	$h(x) = 1000(1.03)^x$
Initial Value (a)			
Base (b)			
Domain			
Range			
Horizontal Intercept			
Vertical Intercept			
Horizontal Asymptote			
Increasing or Decreasing			
Growth or Decay			

Section 5.3: Solving Exponential Equations

6. Given $f(x) = 50(1.25)^x$, determine each of the following and show complete work.

     a) *f(5)* =   b) *f(50)* =

     c) Find *x* when *f(x)* = *75*   d) Find *x* when *f(x)* = *−25*

7. Given $f(x) = 100(0.90)^x$, determine each of the following and show complete work.

     a) *f(3)* =   b) *f(30)*=

     c) Find *x* when *f(x)* = *25*   d) Find *x* when *f(x)* = *50*

8. Given $f(x) = 25(3)^x$, determine each of the following and show complete work.

     a) *f(1)* =   b) *f(3)*=

     c) Find *x* when *f(x)* = *100*   d) Find *x* when *f(x)* = *5000*

Section 5.4: Applications of Exponential Funcitons

9. The rabbit population in several counties is shown in the following table. Assume this growth
    is exponential. Let $t = 0$ represent the year 2006. Let a represent the initial population in
    2006. Let b represent the ratio in population between the years 2006 and 2007.

Year	Rabbit Population		
	Coconino	Yavapai	Harestew
2006	15000	8000	25000
2007	18000	12800	18750
2008	21600	20480	14063
2009	25920	32768	10547

   a) Write the equation of the exponential mathematical model for each situation. Round any
       decimals to two places. Be sure your final result uses proper function notation. Use *C(t)*
       for Coconino, *Y(t)* for Yavapai and *H(t)* for Harestew.

   b) Use the models from part a) to forecast the rabbit population in 2012 for each county.
       Round to the nearest rabbit. Use proper function notation to represent each result.

c) Use the models from part a) to find the following. Show complete work.

      i.   The Rabbit Population in Coconino County reaches 60,000.

      ii.   The Rabbit Population in Yavapai Country reaches 340,000.

      iii.   The Rabbit Population in Harestew falls below 5000.

d) Which of the scenarios from part c) happened first? Explain your reasoning.

10. Assume you can invest $1000 at 5% Simple Interest or 4% Compound Interest (Annual). The equation for Simple Interest is modeled by: $A = P + Prt$. Compound Interest is modeled by $A = P(1+r)^t$. The corresponding equations for these two types of interest are given below.

$S(t) = 1000 + 50t$ $C(t) = 1000(1.04)^t$

a) Complete the table for each function.

t	1	5	10	15	20
$S(t)$					
$C(t)$					

b) What is the vertical intercept for each function and what does it represent in the context of this problem?

c) Graph these two functions on the same graph. Plot and label their intersection. Use window Xmin=0, Xmax = 20, Ymin=1000, Ymax=2500.


d) When would the two investments return the same amount? How much would they return?

e) Which investment would you go with in the short term (less than 10 years)? Explain.

11. In 2010, the estimated population of Maricopa County was 3,817,117. By 2011, the
     population had grown to 3,880,244.

   a) Assuming that the growth is linear, construct a linear equation that expresses the
       population, P, of Maricopa County t years since 2010.

   b) Assuming that the growth is *exponential*, construct an exponential equation that expresses
       the population, P, of Maricopa County t years since 2010.

   c) Use the equation found in part a) to predict the population of Maricopa County in 2015.

   d) Use the equation found in part b) to predict the population of Maricopa County in 2015.

12. In each situation below, you will need to graph to find the solution to the equation using the INTERSECTION method described in this lesson. Fill in the missing information for each situation. Include a rough but accurate sketch of the graphs and intersection point. Mark and label the intersection. Round answers to two decimal places.

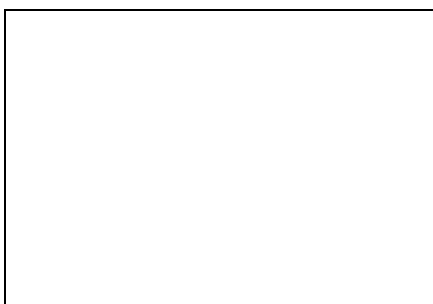a) Solve $25(1.25)^x = 400$ Solution: $x =$ _____
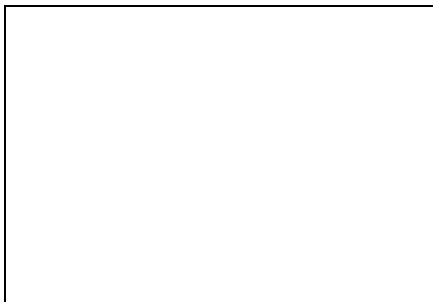
Xmin:_____

Xmax:_____

Ymin:_____

Ymax:_____

b) Solve $300(0.85)^x = 80$ Solution: $x =$ _____

Xmin:_____

Xmax:_____

Ymin:_____

Ymax:_____
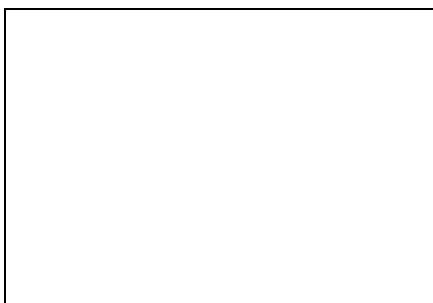
c) Solve $300(0.85)^x = 1700$ Solution: $x =$ _____

Xmin:_____

Xmax:_____

Ymin:_____

Ymax:_____

d) Solve $17.5(2.05)^x = 1$ Solution: $x =$ _____

Xmin:_____

Xmax:_____

Ymin:_____

Ymax:_____
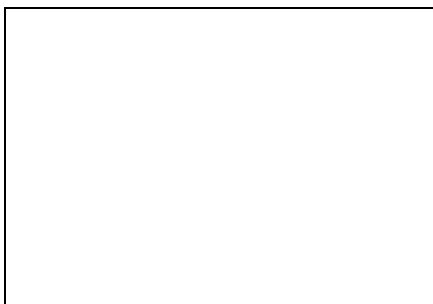
e) Solve $2(1.01)^x = 12$ Solution: $x =$ _____

Xmin:_____

Xmax:_____

Ymin:_____

Ymax:_____

f) Solve $532(0.991)^x = 100$ Solution: $x =$ _____

Xmin:_____

Xmax:_____

Ymin:_____

Ymax:_____