Name: _____ Date: _____

9H – Common Core Algebra Review (Aims 79 – 84)

Work on loose-leaf. Use graph paper when necessary.

1. Capital One bank offers a 0.75% interest rate compounded annually. Suppose John invests $4,000 at Capital One. If no additional deposits or withdrawals are made, how much money will be in his account after 5 years to the nearest penny? How much more money is in his account after 5 years than after 4 years?
2. Kyle invested $15,000 on March 1st of this year at a rate of 1.25% compounded annually. During what year will he have over $20,000?
3. Devin has $10,000 in an account after he invested it at 5% compounded quarterly for 6 years. What was his initial deposit, to the nearest dollar, if he made no withdrawals or deposits throughout those 6 years?
4. George's house is currently worth $650,000. House prices in his area are expected to increase at 1.3% annually over t years.
   a. Write an explicit formula, f(t), to determine the estimated price of his house after t years.
   b. Find the price of his house after 20 years. Round your answer to the nearest thousand.
5. The current value of a clearance couch at Pottery Barn is $2,000. The selling price will decrease by one-tenth its value each week it does not get sold.
   a. Write an explicit formula, f(w), to determine the price of the couch after w weeks.
   b. Find the selling price of the couch if it does not get sold after 10 weeks to the nearest cent.
   c. After how many weeks will the price be below $400?
6. A certain rare coin appreciates over time. The equation $y = 500(1.052)^x$ represents the value, y, of the coin for a period of x years. What is the y-intercept of this equation and what does it represent? After how many years will its value cross the $3,000 mark?
7. Jess and Dan are studying the spread of a certain YouTube video. Jess discovers that the growth over t months can be defined by the function $f(t) = (9) \cdot 3^t$. Dan finds that the growth function over t months is $g(t) = 3^{t+2}$. Calculate the number of video views that Dan and Jess will each have after 7 months. Based on the growth from both functions, explain the relationship between f(t) and g(t).
   b. Which day will be the first day that the number of people receiving the email exceeds 100?
8. Write the function to describe each situation where t is the number of years.
   a. Initial selling price of $250 depreciating at 5% per year.
   b. Initial starting value of $1,290 increasing at 4% per year.
   c. Initial population of 5,700 people increasing at 3.2% per year.
   d. Initial starting salary of $89,500 increasing $4,500 per year.
   e. Initial supply of 450 bananas decreasing by 15 bananas per year.
   f. Initial deposit of $45,000 receiving 8% interest compounded semi-annually.
   g. Initial deposit of $1,250 receiving 2.4% interest compounded monthly.
9. Write a table of values using the domain of whole numbers less than or equal to four to represent each description:
   a. A constant growth of 4 where the initial value is 7.
   b. An exponential growth rate of 3 where the initial value is 1/9.
   c. A linear decline of 6 where the initial value is 0.
   d. An exponential decay factor of $\frac{1}{2}$ when the initial value is 256.

10. The population of sea monkeys starts at 100 and grows at a rate of 5% per day. The food supply is able to support 200 sea monkeys and is able to support 4 less sea monkeys per day. On which day will the food supply be unable to support the population of sea monkeys?

11. Determine if the following equations represent growth or decay. State the y-intercept and the rate of either growth or decay as a percentage.

a. $y = 3(1.2)^x$ b. $y = .5(.87)^x$ c. $y = \left(\frac{4}{5}\right)^x$ d. $y = 8\left(\frac{7}{6}\right)^x$

12. For each of the given functions, $f(x) = 2^x$, $g(x) = 2^x + 3$, $h(x) = 2^{x+3}$, and $m(x) = 2^{x-1} - 2$
   a. State the transformation that applies to the parent function f(x) in order to generate the functions g(x), h(x), and m(x).
   b. Identify the asymptote for each function.
   c. Identify the y-intercept for each function.

13. What graphic transformation has been applied to $g(x) = 2^x$ to create each of the four new functions given below?

a. $h(x) = 2^{x+5} - 4$ b. $f(x) = 2^{x-4} + 5$ c. $m(x) = 3(2^{x+1}) - 1$ d. $p(x) = \frac{1}{4}(2^x) + 2$

14. a. Graph the function $y = 2^x + 1$. Identify the domain, range, and its asymptote. Find the average rate of change from x = -2 to x = 0.
   b. Graph the reflection of the graph in (a) about the x-axis. Write the equation of that new graph.

15. The following tables represent different sets of data. Write either the linear or exponential equation that best models the data.

x	f(x)
0	-1
1	-1/2
2	-1/4
3	-1/8

x	f(x)
5	1
15	3
25	5
35	7

x	0	1	3
f(x)	2	6	54

16. Write the equation of the following exponential graphs: