**Exponential and Logarithmic Functions Test Review**

**Directions:** Be sure to show all work, communicate your thought process, and justify your reasoning. Remember to check that your answers are complete, correct, and reasonable.

1. The value of a certain item is initially $1,000, but depreciates at a rate of 87.5% every four years.

a. Write a function V(t) to represent the value, V, of the item after t years.

b. How long will it take for the item to be worth less than $10? Round to the nearest year.

c. Does the rate of change in the item’s value increase or decrease over time?

 Is V(t) linear or non-linear?

2. Plutonium-239 decays according to the equation A = A0e-0.0000288t, where time is measured in years. Determine the half-life of plutonium-239 .

3. After appraisal this year, the values of three cars are expected to be modeled by the following functions, where V(t) is the value t years from now (2016).

**Car A:** V(t) = 54500e0.0123t **Car B:** V(t) = 75000e0.0128t **Car C:** V(t) = 68500e-0.0135t

a. Order the cars in terms of their current value, from least to greatest. \_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_

b. State whether each car’s value is expected to increase or depreciate over time.

Car A: Car B: Car C:

c. For each car, determine when the car will be expected to be worth $200,000 dollars.

4. Expand each logarithm.

a.  b. 

c.  d. 

5. Condense each logarithm.

a.  b. 

6. Evaluate each logarithm. If necessary, round to the nearest ten-thousandth.

a. log1/2 b. log84096 c. log81

d. log1/3(27) e. log2562 f. log44

g. log5(8) h. log2013 i. log921

|  |  |
| --- | --- |
| **Year** | **Value** |
| 2011 | $1,300 |
| 2012 | $1,404 |
| 2013 | $1,516.32 |
| 2015 | $1,637.63 |

7. The amount in a saving’s account, recorded at various years is displayed in the table. Write a function that could be used to model the value t years after 2011. Then determine in which year you may expect the value to exceed $3,000, assuming the trend continues.

8. Solve each equation for the variable. Identify any extraneous solutions.

If necessary, round to the nearest ten-thousandth.

a. ln(8a + 59) = ln(-3a - 2) b. log7(7b) + log7(b) = 3

c. 5ed = 30 d. ln(4d – 7) = 18

e. 53x – 3 = 33 f. 12log6(3y – 12) = 36

g. log5(2p) – log56 = log554 h. log(3h) + log(h – 1) = log(8)

9. Describe how you can tell if a logarithmic equation has no solution, and why.

10. **If given exponential form, convert the expression to logarithmic form.**

 **If given logarithmic form, convert the expression to exponential form.**

a. pq = m **⇔ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** b. log749 = 2 **⇔ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

11. A certain isotope has a half-life of 7,870 years.

a. Write a function M(t) to represent the mass of the isotope in a rock sample that is t years old, assuming the original mass is M0 grams.

d. A sample is found to have one-fifth of the original amount of the isotope.

 How old is the sample?

\*Also check the website for more additional (optional) practice with exponential and logarithmic equations and expressions! ☺