Week 9 Problems

Name: Neal Nelson

Show Scored View

#1 Points possible: 1. Total attempts: 2

For each table below, could the table represent a function that is linear, exponential, or neither?

x	1	2	3	4
f(x)	90	81	72.9	65.61

f(x) is Select an answer

x	1	2	3	4
g(x)	90	80	70	60

g(x) is Select an answer

x	1	2	3	4
h(x)	80	61	42.9	25.61

h(x) is Select an answer
Exponential
Linear
Neither

#2 Points possible: 1. Total attempts: 2

An exponential function $f(x) = a \cdot b^x$ passes through the points (0, 3) and (3, 375). What are the values of a and b?

a = ____ and b = ____
3
5

#3 Points possible: 1. Total attempts: 2

Find a formula for the exponential function passing through the points $(-3, \frac{5}{27})$ and (1,15)

y = _____
$5 \cdot (3)^x$

#4 Points possible: 1. Total attempts: 2

Write the equation in exponential form. Assume that all constants are positive and not equal to 1.

$\log(v) = q$

_____
$10^q = v$

#5 Points possible: 1. Total attempts: 2

Write the equation in exponential form. Assume that all constants are positive and not equal to 1.

$\log_z(q) = y$

_____
$z^y = q$

#6 Points possible: 1. Total attempts: 2

Write the equation in logarithmic form. Assume that all constants are positive and not equal to 1.

$2^p = c$

_____ Hint
$\log_2(c) = p$

#7 Points possible: 1. Total attempts: 2

Evaluate the following expressions. Your answers must be exact and in simplest form.

(a) $\ln e^7 =$ _____

(b) $e^{\ln 5} =$ _____

(c) $e^{\ln\sqrt{3}} =$ _____

(d) $\ln\left(\frac{1}{e^3}\right) =$ _____
7
5
sqrt(3)
-3

#8 Points possible: 1. Total attempts: 2

Which of the following are equivalent to $\log_b(4)$?

- ☐ $\log_b(40)-\log_b(10)$
- ☐ $\frac{1}{3}\log_b(64)$
- ☐ $-\log_b\left(\frac{1}{4}\right)$
- ☐ $\frac{1}{2}\log_b(16)$
- ☐ $\log_b\left(\frac{1}{10}\right)+\log_b(40)$

all of the above

#9 Points possible: 1. Total attempts: 2

Which of the following are equivalent to $2\cdot\log\left(u^{-1/3}\right)$? Assume $u>0$.

- ☐ $-\frac{1}{3}\log(u^2)$
- ☐ $-\log\left(u^{2/3}\right)$
- ☐ $\log\left(\frac{1}{u^{2/3}}\right)$
- ☐ $-\frac{2}{3}\log(u)$
- ☐ $\log\left(\frac{1}{\sqrt[3]{u^2}}\right)$

all of the above

#10 Points possible: 1. Total attempts: 2

A population numbers 13,000 organisms initially and decreases by 5.1% each year.

Suppose P represents population, and t the number of years of growth. An exponential model for the population can be written in the form $P=a\cdot b^t$ where

P = _____
$13000(0.949)^t$

#11 Points possible: 1. Total attempts: 2

A vehicle purchased for $20700 depreciates at a constant rate of 8%. Determine the approximate value of the vehicle 10 years after purchase.

Round to the nearest whole number.

_____
$8992

#12 Points possible: 1. Total attempts: 2

A radioactive substance decays exponentially. A scientist begins with 170 milligrams of a radioactive substance. After 26 hours, 85 mg of the substance remains. How many milligrams will remain after 45 hours?

_____ mg

Give your answer accurate to at least one decimal place
51.2~~19515654255~~

#13 Points possible: 1. Total attempts: 2

A house was valued at $95,000 in the year 1995. The value appreciated to $165,000 by the year 2008.

A) What was the annual growth rate between 1995 and 2008?
r = _____ *Round the growth rate to 4 decimal places.*

B) What is the correct answer to part A written in percentage form?
r = _____ %.

C) Assume that the house value continues to grow by the same percentage. What will the value equal in the year 2012 ?
value = $ _____ *Round to the nearest thousand dollars.*
0.0434
4.34
196,000

#14 Points possible: 1. Total attempts: 2

A car was valued at $28,000 in the year 1992. The value depreciated to $15,000 by the year 2005.

A) What was the annual rate of change between 1992 and 2005?
r = _____ *Round the rate of decrease to 4 decimal places.*

B) What is the correct answer to part A written in percentage form?
r = _____ %.

C) Assume that the car value continues to drop by the same percentage. What will the value be in the year 2010 ?
value = $ _____ *Round to the nearest 50 dollars.*
-0.0469
-4.69
11,800

#15 Points possible: 1. Total attempts: 2

A bank features a savings account that has an annual percentage rate of $r = 2.9\%$ with interest compounded quarterly. Melissa deposits $2,000 into the account.

The account balance can be modeled by the exponential formula $A(t) = a\left(1+\frac{r}{k}\right)^{kt}$, where A is account value after t years , a is the principal (starting amount), r is the annual percentage rate, k is the number of times each year that the interest is compounded.

(A) What values should be used for a, r, and k ?

$a =$ _____, $r =$ _____, $k =$ _____

(B) How much money will Melissa have in the account in 7 years?
Answer = $ _____.
Round answer to the nearest penny.

(C) What is the annual percentage yield (APY) for the savings account? (The APY is the actual or effective annual percentage rate which includes all compounding in the year).
$APY =$ _____%.
Round answer to 3 decimal places.
2000
0.029
4
2,448.35

$\left(1+\frac{0.029}{4}\right)^4 - 1 = 0.0293169$ = 2.932%

#16 Points possible: 1. Total attempts: 2

The fox population in a certain region has an annual growth rate of 9 percent per year. It is estimated that the population in the year 2000 was 8300.

(a) Find a function that models the population t years after 2000 ($t = 0$ for 2000).
Your answer is $P(t) =$ _____

(b) Use the function from part (a) to estimate the fox population in the year 2008.
Your answer is (the answer should be an integer) _____
$8300 \cdot (1.09)^t$
16538

#17 Points possible: 1. Total attempts: 2

The fox population in a certain region has a continuous growth rate of 8 percent per year. It is estimated that the population in the year 2000 was 5800.

(a) Find a function that models the population t years after 2000 ($t = 0$ for 2000).
Your answer is $P(t) =$ _____

(b) Use the function from part (a) to estimate the fox population in the year 2008.
Your answer is (the answer must be an integer) _____
$5800 \cdot e^{0.08 \cdot t}$
10999

#18 Points possible: 1. Total attempts: 2

Solve.

$\log_8(t) = -4$

$t =$ _____
$8^{-4} = \frac{1}{8^4} = 0.000244140625$

#19 Points possible: 1. Total attempts: 2

Find the logarithm.

$\log_2\left(\frac{1}{4}\right) =$ _____
-2

#20 Points possible: 1. Total attempts: 2

Find the logarithm.

$\log_3\left(3^{\frac{1}{2}}\right)=$ _____

$\frac{1}{2}$

#21 Points possible: 1. Total attempts: 2

Find the logarithm.

$\log_{10}\left(\frac{1}{100{,}000}\right)=$ _____

-5

#22 Points possible: 1. Total attempts: 2

Simplify. Enter the result as a single logarithm with a coefficient of 1.

$\log_5(11x^6)+\log_5(2x^2)$

$=$ _____

$\log_5(22x^8)$

#23 Points possible: 1. Total attempts: 2

Simplify. Enter the result as a single logarithm with a coefficient of 1.

$\log_9(12x^6)-\log_9(x^2)$

$=$ _____

$\log_9\left(\frac{12x^4}{1}\right)$

#24 Points possible: 1. Total attempts: 2

The half-life of Radium-226 is 1590 years. If a sample contains 200 mg, how many mg will remain after 4000 years?

_____ mg

Give your answer accurate to at least 2 decimal places.

34.9721

#25 Points possible: 1. Total attempts: 2

The half-life of Palladium-100 is 4 days. After 24 days a sample of Palladium-100 has been reduced to a mass of 1 mg.

What was the initial mass (in mg) of the sample? _____

What is the mass 8 weeks after the start? _____ mg

64

0.0039~~0625~~

#26 Points possible: 1. Total attempts: 2

At the beginning of an experiment, a scientist has 280 grams of radioactive goo. After 90 minutes, her sample has decayed to 8.75 grams.

What is the half-life of the goo in minutes? _____

Find a formula for $G(t)$, the amount of goo remaining at time t. $G(t)=$ _____

How many grams of goo will remain after 44 minutes? _____

18

$280 \cdot 2^{-\frac{t}{18}}$

51.440707229646

#27 Points possible: 1. Total attempts: 2

A wooden artifact from an ancient tomb contains 60 percent of the carbon-14 that is present in living trees. How long ago, to the nearest year, was the artifact made? (The half-life of carbon-14 is 5730 years.)

_____ years.

4223

#28 Points possible: 1. Total attempts: 2

The count in a bateria culture was 700 after 15 minutes and 2000 after 40 minutes. Assuming the count grows exponentially,

What was the initial size of the culture? _____

Find the doubling period. _____ minutes

Find the population after 115 minutes. _____

When will the population reach 12000. _____ minutes

372.85~~405154225~~
16.506~~300552842~~
46647.23~~03207~~
82.668~~16795473~~

#29 Points possible: 1. Total attempts: 2

A roasted turkey is taken from an oven when its temperature has reached 185 Fahrenheit and is placed on a table in a room where the temperature is 75 Fahrenheit. Give answers accurate to at least 2 decimal places.

(a) If the temperature of the turkey is 156 Fahrenheit after half an hour, what is its temperature after 45 minutes?

_____ Fahrenheit

(b) When will the turkey cool to 100 Fahrenheit?

_____ hours.

144.507
2.421

#30 Points possible: 1. Total attempts: 2

You go to the doctor and he gives you 11 milligrams of radioactive dye. After 16 minutes, 7.5 milligrams of dye remain in your system. To leave the doctor's office, you must pass through a radiation detector without sounding the alarm. If the detector will sound the alarm if more than 2 milligrams of the dye are in your system, how long will your visit to the doctor take, assuming you were given the dye as soon as you arrived? Give your answer to the nearest minute.

You will spend _____ minutes at the doctor's office.

71
