WORKSHEET #6

Exponential Function Review **Name** _____Key_____

Test Date: _____

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1. For the exponential function: $y = 80(1.5)^x$

a) What is the initial value? 80

b) What is the multiplier? 1.5

c) What is the rate? 0.5

d) Growth or decay? Growth

2. A $100 investment is in a savings account with an interest rate of 4.5% a compounded monthly.

a. Write the equations the models this.

$$A = 100(1 + \frac{0.045}{12})^{12t}$$

b. Find amount in 3 years.

$$100(1 + \frac{0.045}{12})^{12(3)} = \$114.42$$

~~c. How long until it doubles? (Round to nearest 1st decimal.)~~

3. Your used car is worth $5800. If the rate of depreciation is 13%,

a) Find the value of the car after 5 years.

$$5800(1-.13)^5 = \$2890.84$$

b) If the car is eight years old, what was the new value?

$$5800(1-.13)^{-8} = \$17{,}671.52$$

4. An average price for a 1-gallon of gas in 1998 was about \$1.5, suppose if now the average price is \$3.14, then

a. Find the rate of inflation per year.

$$3.14 = 1.5(1 + r)^{16} \rightarrow r = 0.047 = 4.7\%$$

b. Write the equation that models the increasing price of gas.

$$A = 1.5(1 + .047)^{t}$$

c. Suppose the price keeps increasing at this rate, what is the average price in 5 more years?

$$1.5(1 + .047)^{21} = \$3.94$$

5. Find the balance on a \$500 investment with an APR (this it the *r*) of 4% after 10 years, if

a. Compounded quarterly

$$500(1 + \frac{.04}{4})^{4 \cdot 10} = \$744.43$$

b. Compounded monthly.

$$500(1 + \frac{.04}{12})^{12 \cdot 10} = \$745.40$$

c. Compounded daily.

$$500(1 + \frac{.04}{365})^{365 \cdot 10} = \$745.89$$

6. Determine if the functions are growth (*g*) or decay (*d*).

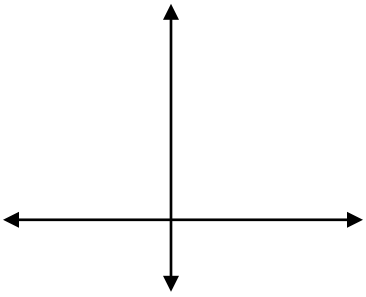
a) $y = 0.1 \cdot 2^{x}$ _g_

b) $f(x) = 9(.25^{x})$ _d_

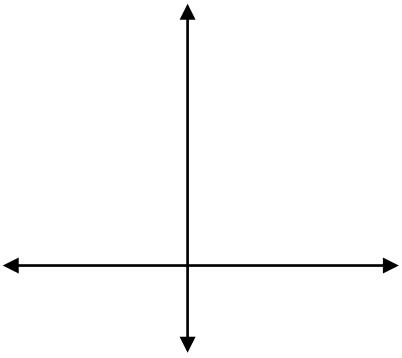
c) $y = \left(\frac{3}{2}\right)^{x}$ _g_

d) $f(x) = 27 \cdot 3^{-x}$ _d_

7. a) Sketch a graph that is an exponential growth.



b) Sketch a graph that represents an exponential decay.



8. A crazy growing germ found on the desks in room 469 doubles every day. Suppose on your desk today there is a population of 55 germ cells.

a) Write the equation that models this. Label your variables.

$$A = 55(2)^t$$

b) How many cells will there be in 3 days?

$$55(2)^3 = 440\ cells$$

c) How many in 2 weeks?

$$55(2)^{14} = 901{,}120\ cells$$

d) How many 5 days **ago**?

$$55(2)^{-5} = 1.72 = 2\ cells$$

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9. You buy your first car for $5000 in 2008. The average **rate** of depreciation for this particular car model is 16%.

a) What is the value of you car after 1 year?

$$500(1 - .16)^1 = \$420$$

b) What is the value of the car 3 years and 6 months from now?

$$500(1 - .16)^{3.5} = \$271.61$$

c) If the car was already 7 years old when you bought it, then what was the value brand new?

$$500(1 - .16)^{-7} = \$1{,}694.40$$

10. In college you take out a $1000 loan your freshmen year to buy books and things, the lender gives you the loan at a rate of 8.5% **compounded daily.** You will not make any payments on the loan until you graduate (*hopefully 4 years later*.) What is the amount you will owe in 4 years?

$$1000\left(1 + \frac{.085}{365}\right)^{365 \cdot 4} = \$1{,}404.89$$

11. My computer 5 years ago was valued at $2225, if now it is worth $450.

a. Find the multiplier

$$\frac{450}{2225} = \frac{2225(1-r)^5}{2225}$$
$$0.2022 = (1-r)^5$$
$$\sqrt[5]{0.2022} = (1-r)$$
$$0.726 = (1-r) = multiplier$$

b. Find the equation that models this.

$$A = 2225(0.726)^t$$

c. What is the rate of deprecation?

$$.905 = (1-r)$$
$$r = .274$$

d. How much will it be in 5 more years?

$$2225(0.726)^{10} = \$90.51$$

12. Find the balance on a $500 investment with an APR (this it the *r*) of 3.75% after 5 years, if:

d. Compounded quarterly

$$5000\left(1+\frac{.0375}{4}\right)^{4\cdot 5} = \$6{,}025.89$$

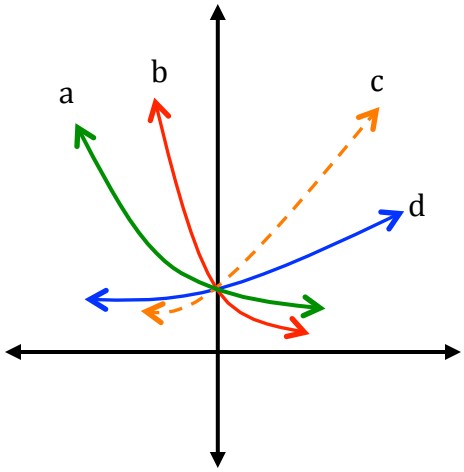
e. Compounded monthly.

$$5000\left(1+\frac{.0375}{12}\right)^{12\cdot 5} = \$6{,}029.39$$

f. Compounded daily.

$$5000\left(1+\frac{.0375}{365}\right)^{365\cdot 5} = \$6{,}031.09$$

13. Using the graphs below, answer the following questions. There could be none to more than one answer.



Which one(s) are/have:

i) A negative rate? *a* and *b*

ii) The largest multiplier? *c*

iii) Will eventually touch the *x*-axis? *None!*

iv) Could be the graph of $y = 2^{-x}$? *a* or *b*

14. Fill in with correct response.

a) If the rate of growth is 0.1% then what is the multiplier? *1.001*

~~b) If something has half-life, then the rate *(circle one) growth / decay* is ___?~~

c) If an interest rate is compounded quarterly then is it compounded how many times per year? *4*

d) What is the ***rate*** of an exponential function that doubles? *100% or 1.*00 (the multiplier = 2)

15. Suppose the number of rabbits found on university campus **doubles** every month. Suppose today there is a population of 24.

e) Write the equation that models this. Label your variables.

$$A = 24(2)^t$$

f) How many ~~bugs~~ *rabbits* will there be in 4 months?

$$24(2)^4 = 384\ rabbits$$

g) How many in a **year**?

$$24(2)^{12} = 98{,}304\ rabbits$$

h) How many a 6 weeks **ago**?

$$24(2)^{-1.5} = 8.49 = 9\ rabbits$$

16. Sketch the graph of $f(x) = 3^x$

a. Domain: $x = all\ real\ numbers$

b. Range: $y > 0$

c. y- intercept: $(0,1)$

d. x –intercept: $none$

17. Sketch the graph of $f(x) = \frac{1}{3}^x$

a. Domain: $x = all\ real\ numbers$

b. Range: $y > 0$

c. y- intercept: $(0,1)$

d. x –intercept: $none$

18. Sketch the graph of $f(x) = 4(3)^x$

a. Domain: $x = all\ real\ numbers$

b. Range: $y > 0$

c. y- intercept: $(0,4)$

d. x –intercept: $none$

19. Knowing how the base affects growth (or decay) of a function, sketch $f(x) = 2^x$ and $f(x) = 8^x$