

Name: \_\_\_\_\_

Date: Key 3/13/20

### Average Rate of Change for Exponentials Functions

1: What is the average rate of change of the function  $g(x) = -2x + 6$

A.) Over the interval  $[2, 6]$ ?

$$\begin{matrix} (2, 2) \\ x_1, y_1 \\ (6, -6) \\ x_2, y_2 \end{matrix} \quad \frac{-6-2}{6-2} \rightarrow \frac{-8}{4} \rightarrow \boxed{-2}$$

B.) Over the interval  $[5, 7]$ ?

$$\begin{matrix} (5, -4) \\ (7, -8) \end{matrix} \quad \frac{-8-4}{7-5} \rightarrow \frac{-12}{2} \rightarrow \boxed{-6}$$

C.) Do you think it is true that  $g(x)$  will have a constant average rate of change over any interval? Why or why not?

yes; it is linear so the rate of change is  $-2$ .

2: What is the average rate of change of the function  $f(x) = 2^x$

A.) Over the interval  $[1, 4]$ ?

$$\begin{matrix} (1, 2) \\ (4, 16) \end{matrix} \quad \frac{16-2}{4-1} \rightarrow \boxed{14}$$

B.) Over the interval  $[3, 5]$ ?

$$\begin{matrix} (3, 8) \\ (5, 32) \end{matrix} \quad \frac{32-8}{5-3} \rightarrow \boxed{12}$$

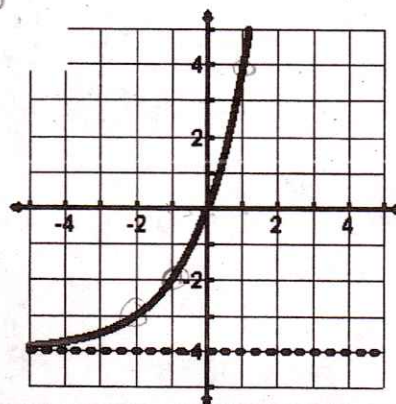
C.) Do you think it is true that  $f(x)$  will have a constant average rate of change over any interval? Why or why not?

no, it is exponential, so it has a varying rate of change

3. ROC from  $[-1, 1]$ : 3  $\frac{4-2}{1-(-1)} \rightarrow 3$

4. ROC from  $[-2, 0]$ :  $\frac{3}{2}$   $\frac{0-3}{0-(-2)} \rightarrow \frac{3}{2}$

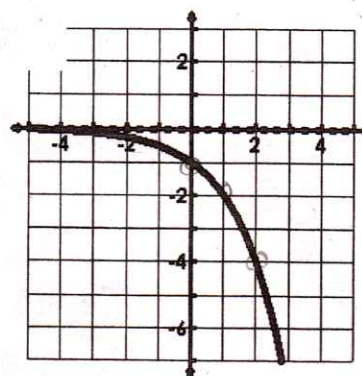
5. ROC from  $[0, 1]$ : 4  $\frac{4-0}{1-0} \rightarrow 4$



6. ROC from  $[0, 1]$ : -1  $\frac{-2-(-1)}{1-0} \rightarrow -1$

7. ROC from  $[1, 2]$ : -2  $\frac{-4-(-2)}{2-1} \rightarrow -2$

8. ROC from  $[0, 2]$ :  $-\frac{3}{2}$   $\frac{-4-(-1)}{2-0} \rightarrow -\frac{3}{2}$



Given a table, find the rate of change for each interval.

x	y
-3	4
-2	1
-1	0
0	1
1	4
2	9
3	16

7.)  $[0, 3]$   $(0, 1)$   $(3, 16)$   $\frac{16-1}{3-0} \rightarrow \boxed{5}$

8.)  $[-2, 1]$   $(-2, 1)$   $(1, 4)$   $\frac{4-1}{1-(-2)} \rightarrow \boxed{1}$

9.)  $[-3, -1]$   $(-3, 4)$   $(-1, 0)$   $\frac{0-4}{-1-(-3)} \rightarrow \boxed{-2}$

x	y
-4	.125
-3	.25
-2	.5
-1	1
0	2
1	4
2	8

10.)  $[-2, 2]$   $(-2, .5)$   $(2, 8)$   $\frac{8-.5}{2-(-2)} \rightarrow \boxed{1.875}$

11.)  $[-4, 1]$   $(-4, .125)$   $(1, 4)$   $\frac{4-.125}{1-(-4)} \rightarrow \boxed{.775}$

12.)  $[-3, 0]$   $(-3, .25)$   $(0, 2)$   $\frac{2-.25}{0-(-3)} \rightarrow \boxed{.583}$

Plug the function into the table of your calculator. Find the 2 ordered pairs. Then find the Average Rate of Change (slope).

13.  $h(x) = 0.5^x$  over the interval  $[-1, 0]$ .

$$\begin{array}{l} (-1, 2) \\ (0, 1) \end{array} \quad \frac{1-2}{0-(-1)} \rightarrow \boxed{-1}$$

14.)  $g(x) = 1.5^x$  over the interval  $[-1, 0]$ .

$$\begin{array}{l} (-1, .67) \\ (0, 1) \end{array} \quad \frac{1-.67}{0-(-1)} \rightarrow \boxed{.33}$$

13.  $h(x) = 3(2)^{x+1}$  over the interval  $[-1, 0]$ .

$$\begin{array}{l} (-1, 3) \\ (0, 6) \end{array} \quad \frac{6-3}{0-(-1)} \rightarrow \boxed{3}$$

14.)  $g(x) = -\left(\frac{1}{4}\right)^x + 2$  over the interval  $[-3, -1]$ .

$$\begin{array}{l} (-3, -62) \\ (-1, -2) \end{array} \quad \frac{-2-(-62)}{-1-(-3)} \rightarrow \boxed{30}$$