

NAME _____

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x}$$

"change in"

Average Rate of Change

1. Find the average rate of change from $x = -1$ to $x = 2$ for each of the functions below.

linear
a. $a(x) = 2x + 3$

$$\frac{7 - 1}{2 - (-1)} = \frac{6}{3} = \boxed{2}$$

quadratic
b. $b(x) = x^2 - 1$

$$\frac{3 - 0}{2 - (-1)} = \frac{3}{3} = \boxed{1}$$

exponential
c. $c(x) = 2^x + 1$

$$\frac{5 - 1.5}{2 - (-1)} = \frac{3.5}{3} = \boxed{1.167} \text{ or } \frac{7}{6}$$

d. Which function has the greatest average rate of change over the interval $[-1, 2]$?

A $\rightarrow a(x) = 2x + 3$

2. Find the average rate of change on the interval $[2, 5]$ for each of the functions below.

a. $a(x) = 2x + 1$

$$\frac{11 - 5}{5 - 2} = \boxed{2}$$

b. $b(x) = x^2 + 2$

$$\frac{27 - 6}{5 - 2} = \boxed{7}$$

c. $c(x) = 2^x - 1$

$$\frac{31 - 3}{5 - 2} = \boxed{9.333} \text{ or } \frac{28}{3}$$

d. Which function has the greatest average rate of change over the interval $x = 2$ to $x = 5$?

C

3. In general as $x \rightarrow \infty$, which function eventually grows at the fastest rate?

a. $a(x) = 2x$

b. $b(x) = x^2$

C $c(x) = 2^x$

4. Find the average rate of change from $x = -1$ to $x = 2$ for each of the continuous functions below based on the partial set of values provided.

a.

x	-1	0	1	2	3
a(x)	-3	-2	1	6	13

$$\frac{6 - (-3)}{2 - (-1)} = \frac{9}{3} = \boxed{3}$$

b.

x	-1	0	1	2	3
b(x)	1	3	5	7	9

$$\boxed{2}$$

c.

x	-1	0	1	2	3
c(x)	-2	-1	1	5	13

$$\boxed{2.333} \text{ or } \frac{7}{3}$$

d. Which function has the greatest average rate of change over the interval $[-1, 2]$?

a(x)

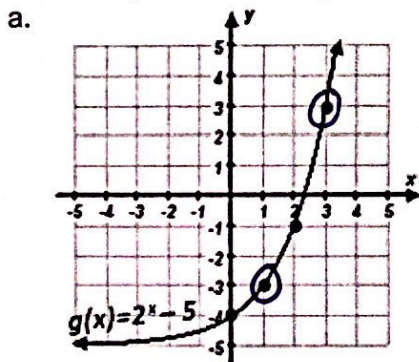
5. Consider the table below that shows a partial set of values of two continuous functions. Based on any interval of x provided in the table which function always has a larger average rate of change?

x	f(x)	g(x)
-1	-2	-4
0	0	0
1	3	8
2	7	24

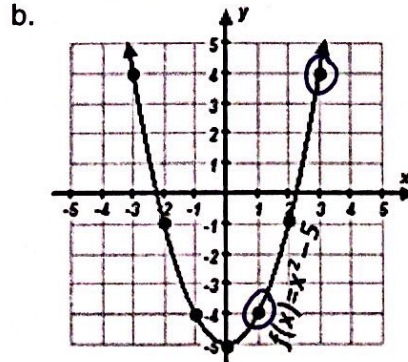
$$\frac{7 - (-2)}{2 - (-1)} = \boxed{3}$$

$$\frac{24 - (-4)}{2 - (-1)} = \frac{28}{3} = \boxed{9.333}$$

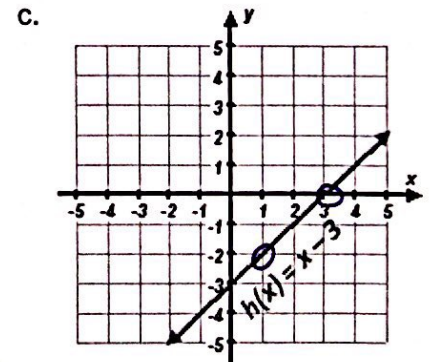
6. Find the average rate of change from $x = 1$ to $x = 3$ for each of the functions graphed below.



$$\frac{3 - (-3)}{3 - 1} = 3$$



$$\frac{4 - (-4)}{3 - 1} = 4$$



$$\frac{0 - (-2)}{3 - 1} = 1$$

d. Which function has the greatest average rate of change over the interval $[1, 3]$?

B