Due date: _____   **Name:** _____
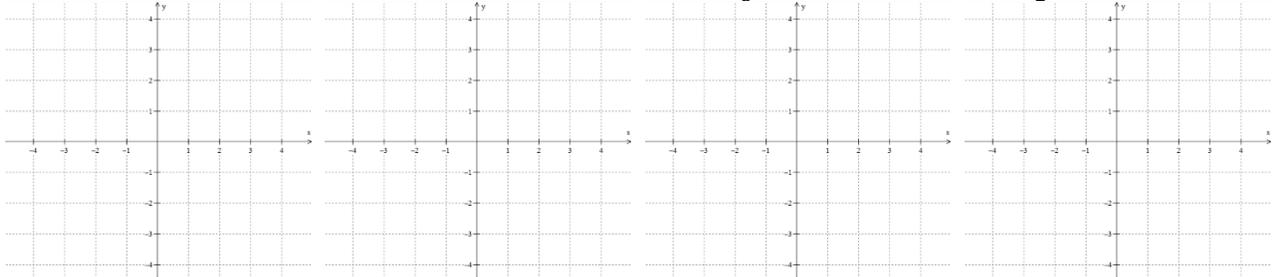
Getting Ready for Derivatives (Part 1)

1. Sketch lines through the origin with slopes:

    a. zero   b. undefined   c. $\frac{2}{3}$ d. $\frac{-3}{2}$

2. Put the following slopes of lines in order from least to greatest: _____

A.   B.   C.   D.   E.   F.

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Notes

Slope of line through (x_1, y_1) and (x_2, y_2): _____

Equation for line going through point (x_1, y_1) with slope m: _____

Equation for line with slope m and y-intercept b: _____

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3. Find the equation of the line in **slope-intercept form** through the following points.
    a) $(3, -4)$ and $(1, 2)$

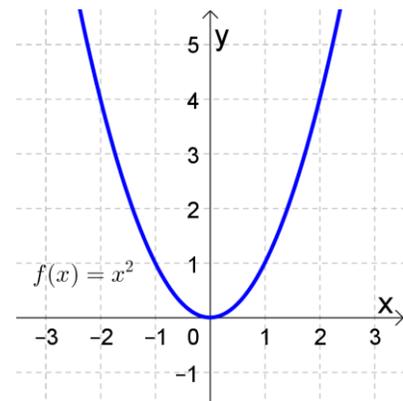   b) $(-2, -1)$ and $(-6, -9)$

Notes

The **average rate of change** of a function $f(x)$ from $x = a$ to $x = b$ is: _____

ex: $f(x) = x^2$

AROC from $x = 0$ to $x = 1$:
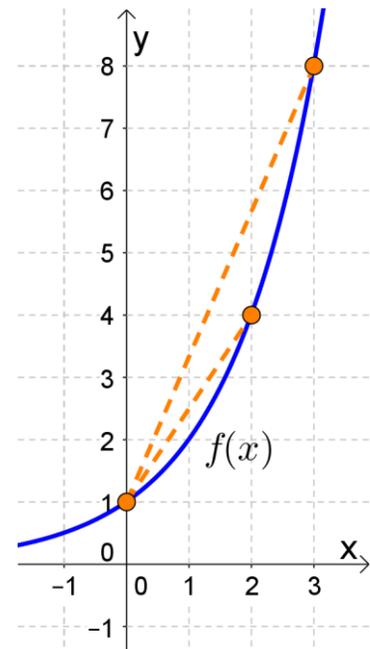
AROC from $x = 1$ to $x = 2$:

AROC from $x = -2$ to $x = 2$:

$f(x) = x^2$

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4. The graph of $f(x)$ is shown to the right.

   a) Use the graph to determine the average rate of change of $f(x)$ between $x = 0$ and $x = 2$.

   b) Use the graph to determine the average rate of change of $f(x)$ between $x = 0$ and $x = 3$.

   $f(x)$

5. You take a road trip to Yellowstone. The graph to the right shows the distance (in miles) you've traveled as a function of time (in hours since the start of the trip). Find your average speed between $t = 1$ hour and $t = 3$ hours. Be sure to write the units for your answer. (Recall: Speed is the rate at which distance changes over time.)

distance (miles)

time (hrs)
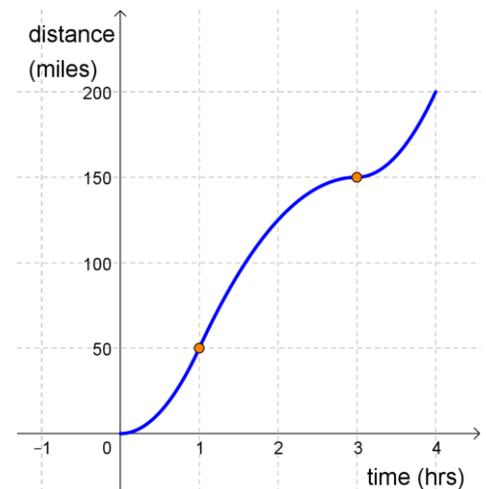
6. Below is a table of the median annual wages for application software developers in the U.S. (in dollars).

Month and Year	Median Annual Wage
May 2010	$87,790
May 2011	$89,280
May 2012	$90,060
May 2013	$92,660
May 2014	$95,510
May 2015	$98,260
May 2016	$100,080
May 2017	$101,790

Source: Bureau of Labor Statistics, http://www.bls.gov/oes/tables.htm

a) Find the average rate of change of the median annual wage for application software developers between May 2013 and May 2014. Write out your calculation and give your answer in dollars per year.

b) Find the average rate of change of the median annual wage for application software developers between May 2010 and May 2017. Write out your calculation and give your answer in dollars per year.

7. Find the average rate of change of $f(x) = \frac{1}{x+2}$ between $x = 0$ and $x = 3$.

Notes

The **difference quotient** of a function $f(x)$ is:

ex: Find the difference quotient of $f(x) = x^2$.

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8. Given the linear function $f(x) = -\frac{1}{2}x + 3$, find the difference quotient $\frac{f(x+h)-f(x)}{h}$ and simplify by canceling the factor of h. What do you observe as you compare the difference quotient to the slope of the linear function?

9. Find the difference quotient $\frac{f(x+h)-f(x)}{h}$ of $f(x) = 2x^2 - 3x$ and simplify by canceling the factor of h.

10. Find the difference quotient $\frac{f(x+h)-f(x)}{h}$ of $f(x) = \frac{1}{x}$ and simplify by canceling the factor of h.

11. Find the difference quotient $\frac{f(x+h)-f(x)}{h}$ of $f(x) = \sqrt{x}$ and simplify by canceling the factor of h.

Practice at home

12. Find the equation of the line in **slope-intercept form** through the following points.
    a) $(-5,\ 6)$ and $(4, -7)$

    b) $(-1, -3)$ and $(2,\ 2)$

13. The position of a particle $s(t)$ (in feet) is shown to the right as a function of t (in minutes). Find the average velocity of the particle over the following time intervals. Be sure to write the units of your answers. (Recall: Velocity is the rate at which position changes over time. It can be positive or negative.)
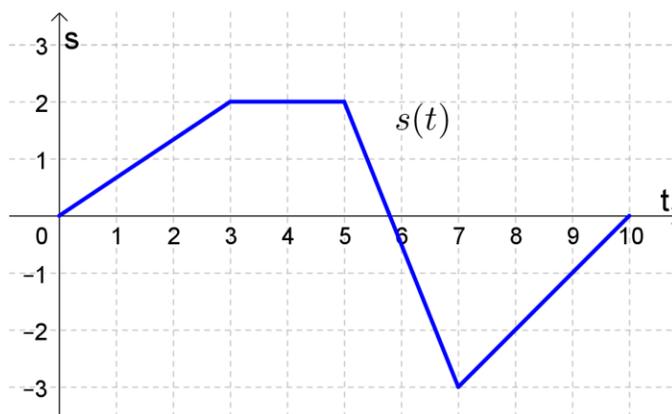
a) $t = 0$ to $t = 3$

b) $t = 3$ to $t = 5$

c) $t = 5$ to $t = 7$

d) $t = 7$ to $t = 10$

e) $t = 0$ to $t = 7$

14. Find the difference quotient $\frac{f(x+h)-f(x)}{h}$ of $f(x) = \frac{1}{x-2}$ and simplify by canceling the factor of h.

15. Find the difference quotient $\frac{f(x+h)-f(x)}{h}$ of $f(x) = \sqrt{x+3}$ and simplify by canceling the factor of h.