Get out

Day 1 - Quadratic Piecewise Functions

to correct!

Day 1 - Quadratic Piecewise Functions: Graphing, Writing and Applications

Name Key Hour

Sketch each piecewise function. Find the domain and range for each piecewise function. Then, evaluate the graph at the specified domain value.

1. $f(x) = \begin{cases} 2x+1 & x \geq 1 \\ x^2+3 & x < 1 \end{cases}$

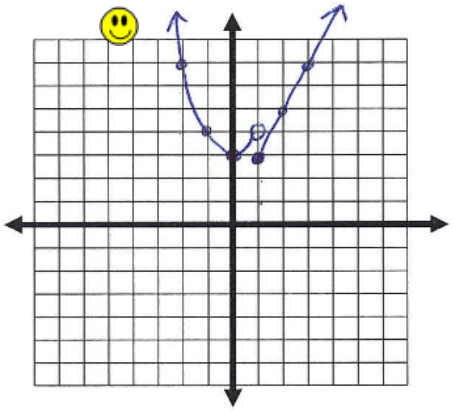
Domain: $(-\infty, \infty)$

Range: $[3, \infty)$

$f(-2) = 7$

$f(6) = 13$

$f(1) = 3$



2. $f(x) = \begin{cases} x^2-1 & x \leq 0 \\ 2x-1 & 0 < x \leq 5 \\ 3 & x > 5 \end{cases}$

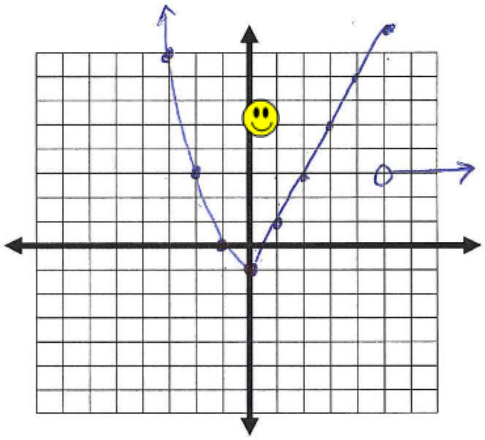
Domain: $(-\infty, \infty)$

Range: $[-1, \infty)$

$f(-2) = 3$

$f(0) = -1$

$f(5) = 9$



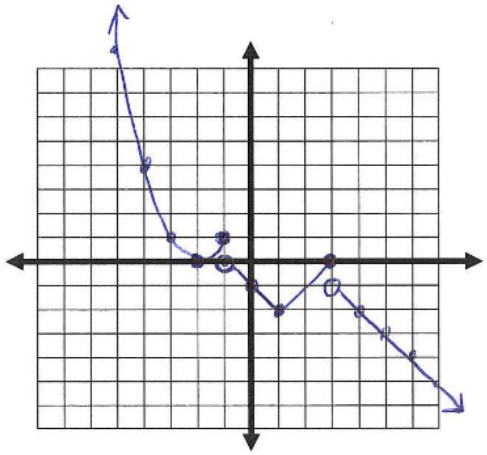
3. $f(x) = \begin{cases} (x+2)^2 & x \leq -1 \\ |x-1| - 2 & -1 < x \leq 3 \\ -x+2 & x > 3 \end{cases}$

Domain: $(-\infty, \infty)$

Range: $(-\infty, 0)$

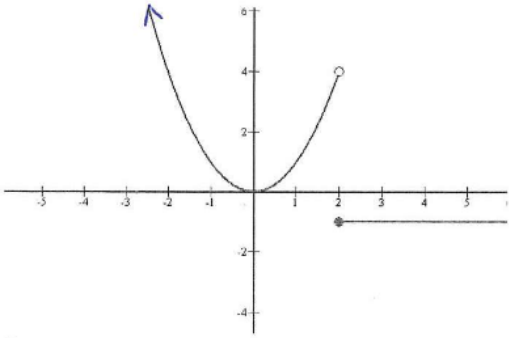
$f(-1) = 1$

$f(6) = -4$



Write a piecewise function for each graph and give the domain and range.

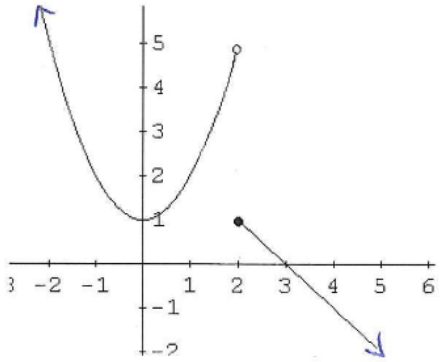
4.



$$f(x) = \begin{cases} x^2, & x < 2 \\ -1, & x \geq 2 \end{cases}$$

Domain $(-\infty, \infty)$ or $\mathbb{R}$ Range $[-1], [0, \infty)$ $y=-1,\ y \geq 0$

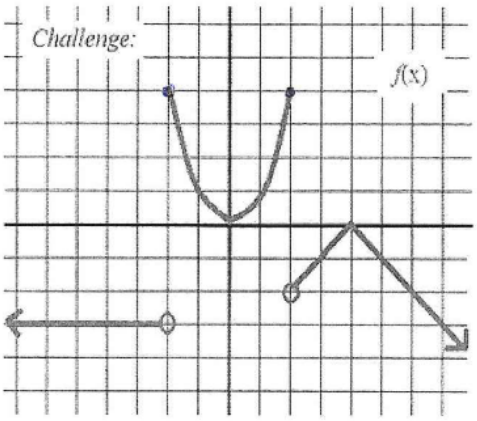
5.



$$f(x) = \begin{cases} x^2+1, & x < 2 \\ -x+3, & x \geq 2 \end{cases}$$

Domain $(-\infty, \infty)$ or $\mathbb{R}$ Range $(-\infty, \infty)$ or $\mathbb{R}$

6.



$$f(x) = \begin{cases} -3, & x < -2 \\ x^2, & -2 \leq x \leq 2 \\ -|x-4|, & x > 2 \end{cases}$$

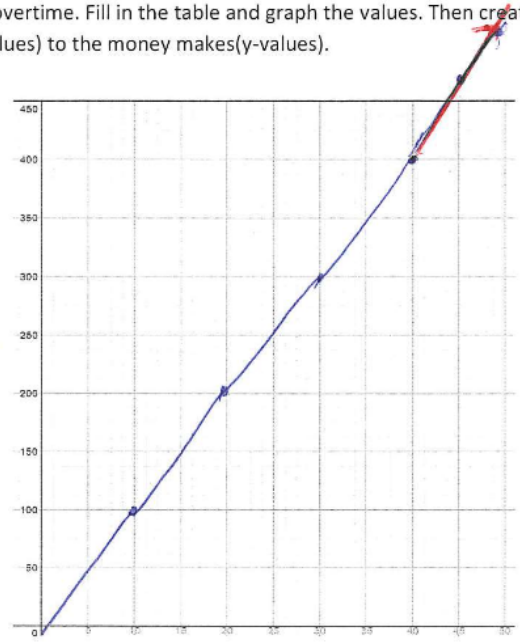
Domain $(-\infty, \infty)$ or $\mathbb{R}$ Range $(-\infty, 4]$ or $y \leq 4$

skipped...

7. Buddy delivers mail to the elves for $10.00 per hour, but he gets overtime for every hour over 40 hours. The overtime is time and a half, so he gets paid $15.00 per hour for overtime. Fill in the table and graph the values. Then create a piecewise function that tracks the hours he works(x-values) to the money makes(y-values).

X(hours)	Y(money)
10	100
20	200
30	300
40	400
50	550
60	700
70	850

$ made



hours worked

$$f(x) = \begin{cases} 10x, & 0 < x \leq 40 \\ 15x - 200, & x > 40 \end{cases}$$

$y - 550 = 15(x - 750)$

$y - 550 = 15x - 750$

$+550 \quad +550$

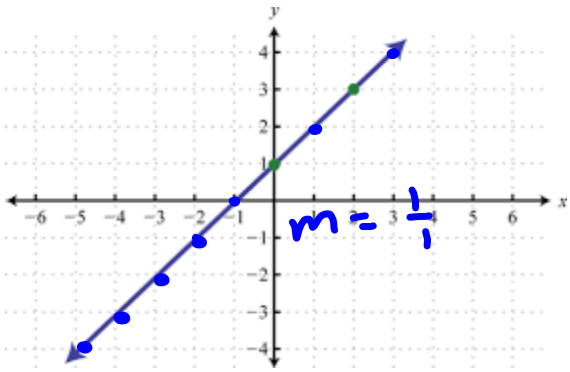
$15x + 475$

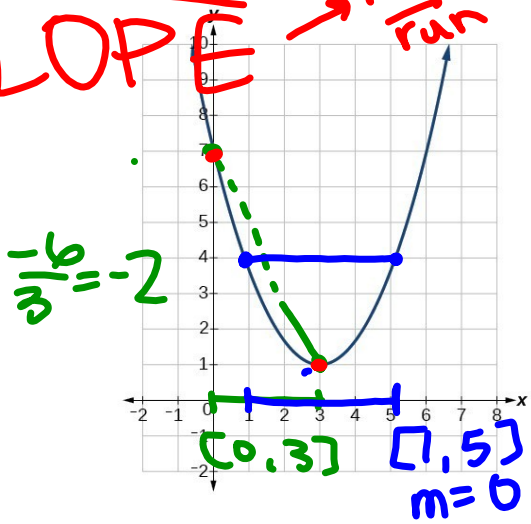
Day 2 - Quadratic Piecewise Functions due Monday

Week #11 Packet due Tuesday

Average Rate of Change

SLOPE → $\frac{\text{rise}}{\text{run}}$



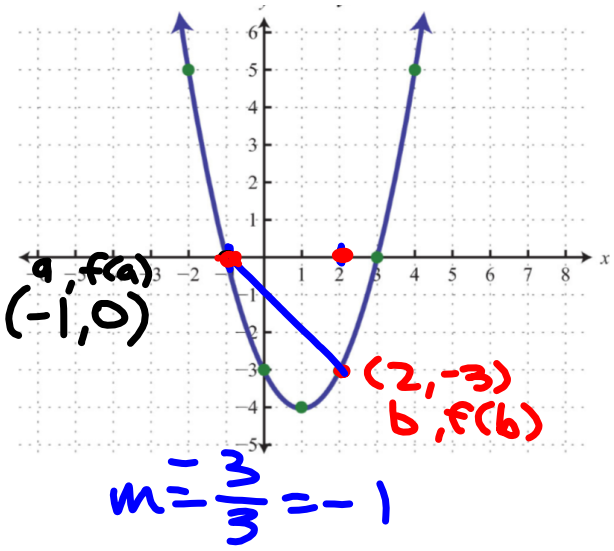


Average Rate of Change on interval [a, b]

$$\frac{f(b)-f(a)}{b-a}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

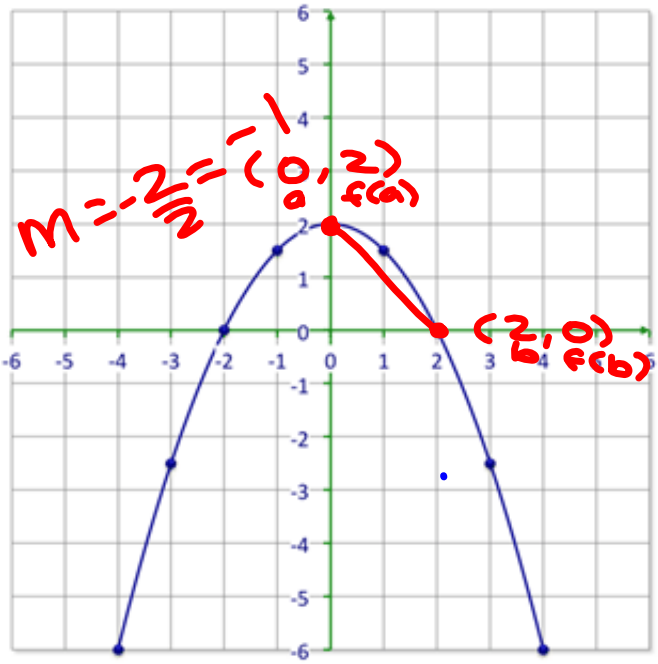
Find the average rate of change over the interval [-1, 2]



$$\frac{f(b)-f(a)}{b-a}$$

$$\frac{-3-0}{2+1} = \frac{-3}{3} = -1$$

Find the average rate of change over the interval [0, 2]



$$\frac{f(b)-f(a)}{b-a}$$

$$\frac{0-2}{2-0} = -\frac{2}{2} = -1$$

Find the average rate of change over the interval [1, 4]

$$\frac{f(b)-f(a)}{b-a}$$

x	y
−3	6
−2	0
−1	−4
0	−6
1	−6
2	−4
3	0
4	6

a f(a) (1, −6)

(4, 6) b, f(b)

$$\frac{6+6}{4-1} = \frac{12}{3} = 4$$

$$6-(-6)$$

Find the average rate of change over the interval [-2, 3]

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

a → f(a)

b → f(b)

$$\frac{f(b)-f(a)}{b-a}$$

$$\frac{9-4}{3-(-2)}=\frac{9-4}{3+2}=\frac{5}{5}=1$$

Find the average rate of change over the interval [1, 3]

$$f(x) = 12x^2 - 5x + 2$$

$$\frac{f(b) - f(a)}{b - a}$$

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

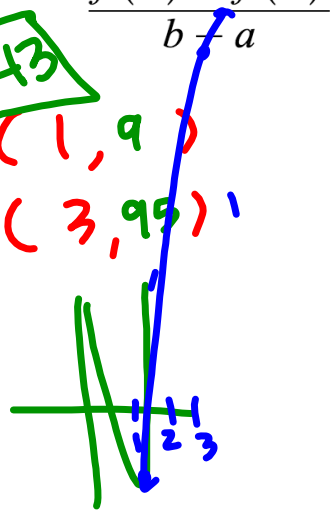
$$\frac{95 - 9}{3 - 1} = \frac{86}{2} = 43$$

$f(3) = 12(3)^2 - 5(3) + 2 = 95$

$f(1) = 12(1)^2 - 5(1) + 2 = 9$

(1, 9)

(3, 95)



Find the average rate of change over the interval [-3, 0]

$f(x) = -x^2 + 3x - 1$

$\frac{f(b) - f(a)}{b - a}$

$\frac{-1-(-19)}{0-(-3)}$

a $(-3, -19)$ $f(a)$

b $(0, -1)$ $f(b)$

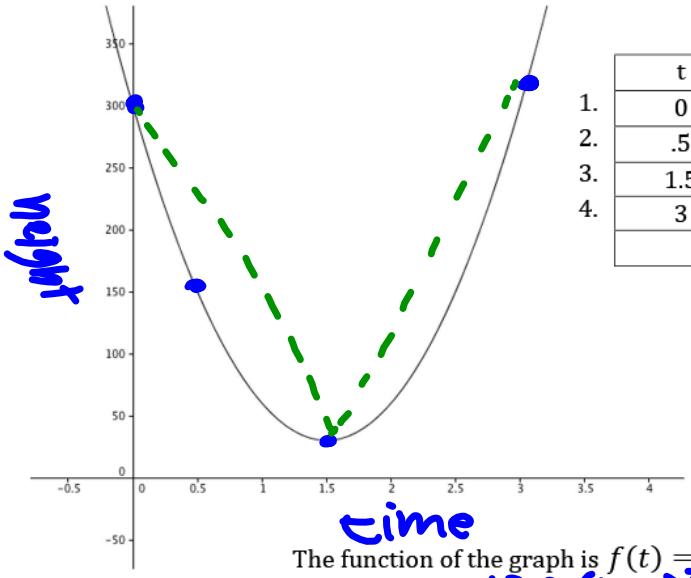
$\frac{18}{3} = 6$

due Tuesday

Average Rate of Change ws
Bungee Breakdown

Name:_____ **Hr:**_____

The graph below models the height of a bungee jumper in feet over the time interval of three seconds [0,3]. The lowest the jumper gets is 30 ft. above the ground. Use values on the graph or use the equation for the function to fill out the table. Then using your table answer the questions below.



	t	f(t)
1.	0	300
2.	.5	150
3.	1.5	30
4.	3	300

The function of the graph is $f(t) = 120t^2 - 360t + 300$

$120(1.5)^2 - 360(1.5) + 300$

5) a. Using the values in your table, find the average rate of change (ARC) of the given interval: [0,1.5].

(0, 300) (1.5, 30)

$\frac{30-300}{1.5-0} = \frac{-270}{1.5} = -180$

b. Interpret your answer.

Fell 180 ft / sec

6) a. Find an interval from where the person stops descent to where the bungee has no tension.

[1.5, 3]

b. Interpret your answer

Going up from 1.5 - 3 seconds at 180ft/sec

7) a. Find an interval that will produce an ARC of 0.

b. Why and when would this occur?

8) Find the average rate of change for the given equation $h(t) = -9t^2 + 45t + 3$ for a soccer ball using the following time intervals

a) [1,2]

b) [2,4]

c) [4,6]

(4, 39) (6, -51) [a, b]

$\frac{f(b)-f(a)}{b-a} = \frac{f(6)-f(4)}{6-4} = \frac{-51-39}{2} = \frac{-90}{2} = -45$

$f(6) = -9(6)^2 + 45(6) + 3 = -51$

$f(4) = -9(4)^2 + 45(4) + 3 = 39$

9) a. Find the average rate of change over a time interval [2,3] for the given equation $h(t) = -16t^2 + 96t + 10$ for a golf ball.

b. What is happening to the golf ball during this interval?

Use the tables below to answer questions 10-15.

Linear

Time (s)	Distance (ft)
0	0
1	3
2	6
3	9
4	12

Quadratic

Time (s)	Distance (ft)
0	0
1	3
2	12
3	27
4	48

Exponential

Time (s)	Distance (ft)
0	0
1	3
2	9
3	27
4	81

10. Is there a time interval when the rates of change are the same?

[0,1] AROC = 3

11. Which function has the greatest rate of change over the time interval from 2 seconds to 4 seconds?

Exponential

12. What observations can you make about the rate of change for the linear function over the time interval given?

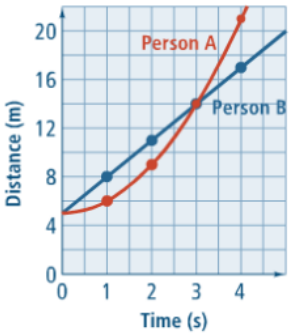
add 3 → constant

13. What observations can you make about the rate of change for the quadratic function over the time interval given?

14. What observations can you make about the rate of change for the exponential function over the time interval given?

15. Which function has the greatest rate of change, and over what time interval?

16. Two people are running along parallel, straight tracks. The graph shows the distance each person has traveled.



a) At what times have the two runners traveled the same distance?

b) What is the average rate of change for the runners over the interval from 1 to 4 seconds, and who is traveling faster over that interval?