17.) $-12 < 4x - 8 \leq 12$

$-4 < 4x \leq 20$

$\{x \mid -1 < x \leq 5\}$

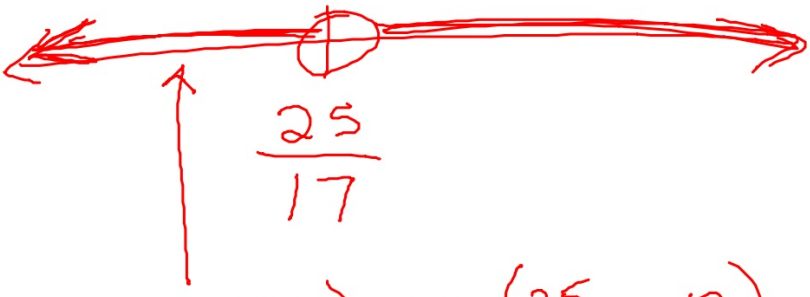
$(-1, 5]$

18.) $x > -1$ <u>and</u> $x \leq 2$

$(-1, 2]$

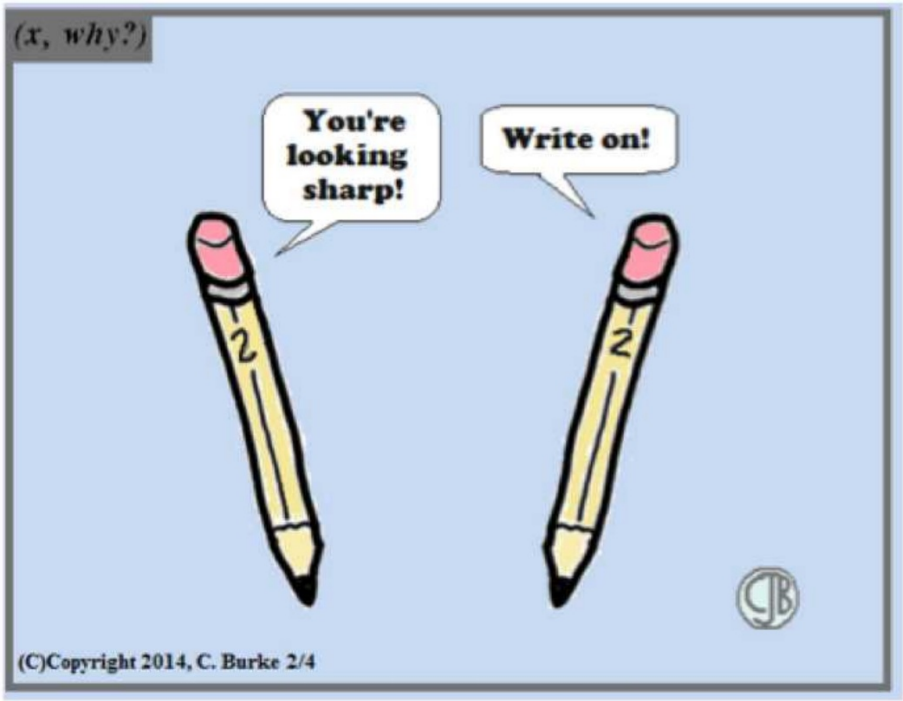
$\{x \mid -1 < x \leq 2\}$

20.) $\{x \mid x \neq \frac{25}{17}\}$

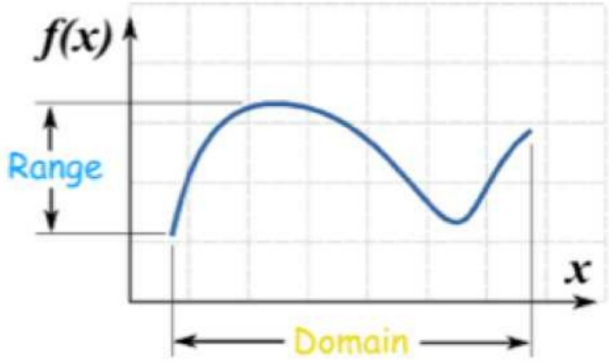


$\left(-\infty, \frac{25}{17}\right) \cup \left(\frac{25}{17}, \infty\right)$

Domain and Range



*See printout.



<u>domain</u> -

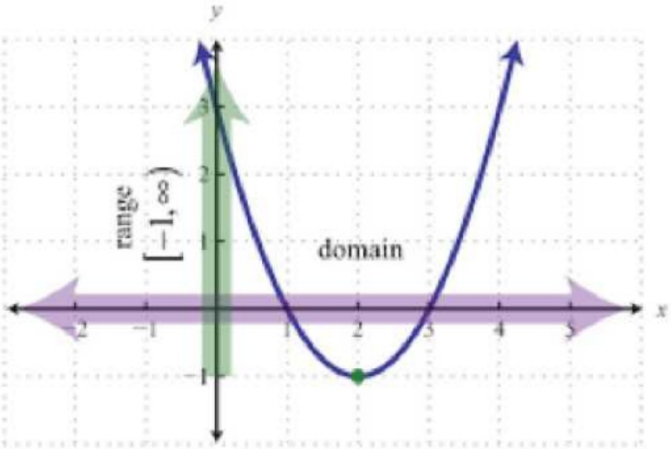
x values

<u>range</u> -

y-values

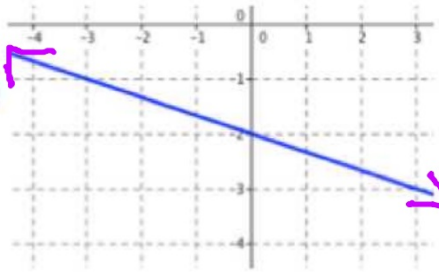
Questions to consider before finding domain and range...

- Does the graph open "left/right" forever?
- Does the open "up/down" forever?
- Can you trace the graph without lifting your pencil?



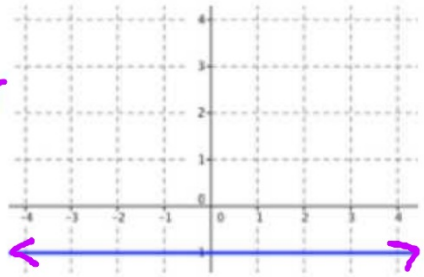
ex: State the domain and range in set and interval notation.

a)

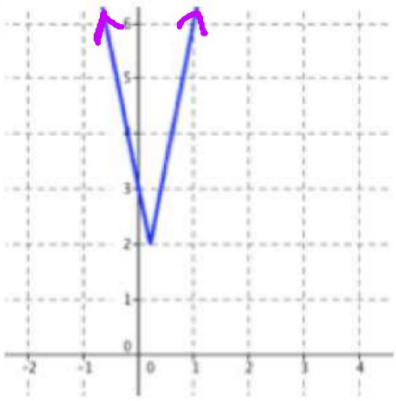
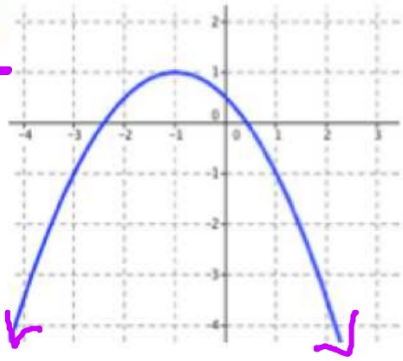


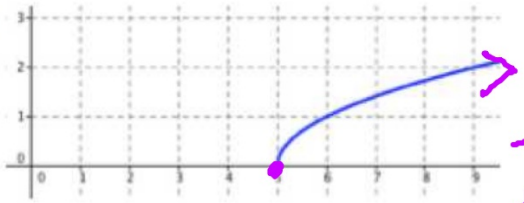
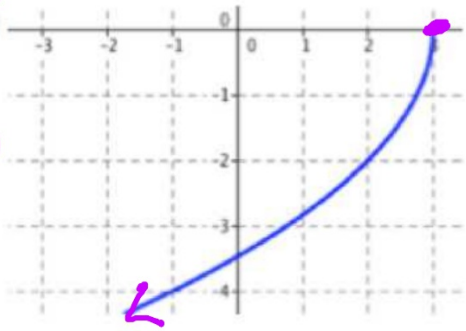
	set	interval
D	$\{x \mid x \in R\}$	$(-\infty, \infty)$
R	$\{y \mid y \in R\}$	$(-\infty, \infty)$

~~b)~~ c.)

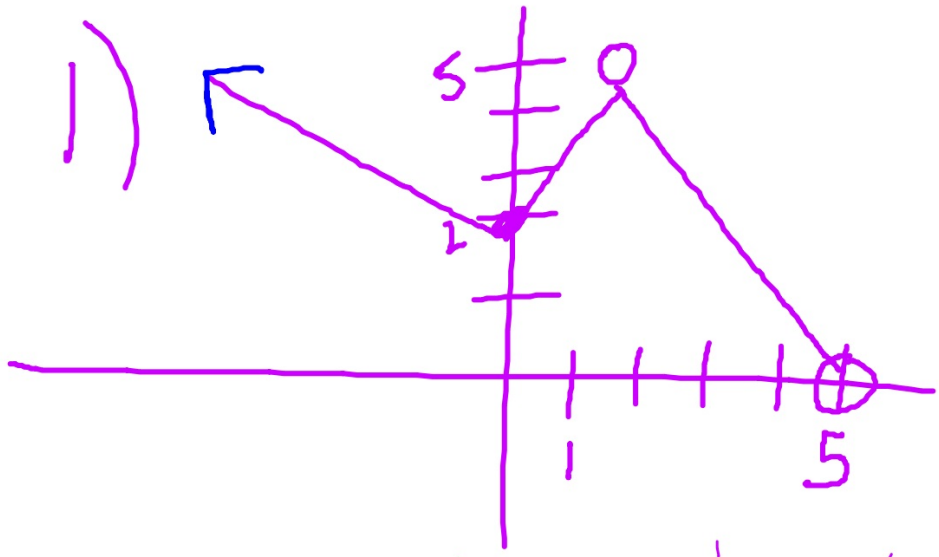


D	$\{x \mid x \in R\}$	$(-\infty, \infty)$
R	$\{y \mid y = -1\}$	$[-1]$

	Set	Interval
~~c)~~ d.) 	D: $\{x \mid x \in R\}$	$(-\infty, \infty)$
	R: $\{y \mid y \geq 2\}$	$[2, \infty)$
~~d)~~ f.D 	D: $\{x \mid x \in R\}$	$(-\infty, \infty)$
	R: $\{y \mid y \leq 1\}$	$(-\infty, 1]$

	Set	Interval
~~e)~~ g.) 	D: $\{x \mid x \geq 5\}$	$[5, \infty)$
	R: $\{y \mid y \geq 0\}$	$[0, \infty)$
~~f)~~ K.) 	D: $\{x \mid x \leq 3\}$	$(-\infty, 3]$
	R: $\{y \mid y \leq 0\}$	$(-\infty, 0]$

1)



	Set	Interval
D:	$\{x \mid x<1 \text{ or } 1<x<5\}$	$(-\infty,1)\cup(1,5)$
R:	$\{y \mid y>0\}$	$(0,\infty)$

ex: Sketch the graph then state the domain and range in the indicated notation.

a) interval notation, $y = |x - 2| + 4$

b) set notation, $y = 3x + 1$

1.1 Graph Quadratic Functions in Standard Form

Standard Form:

$$f(x) = ax^2 + bx + c$$

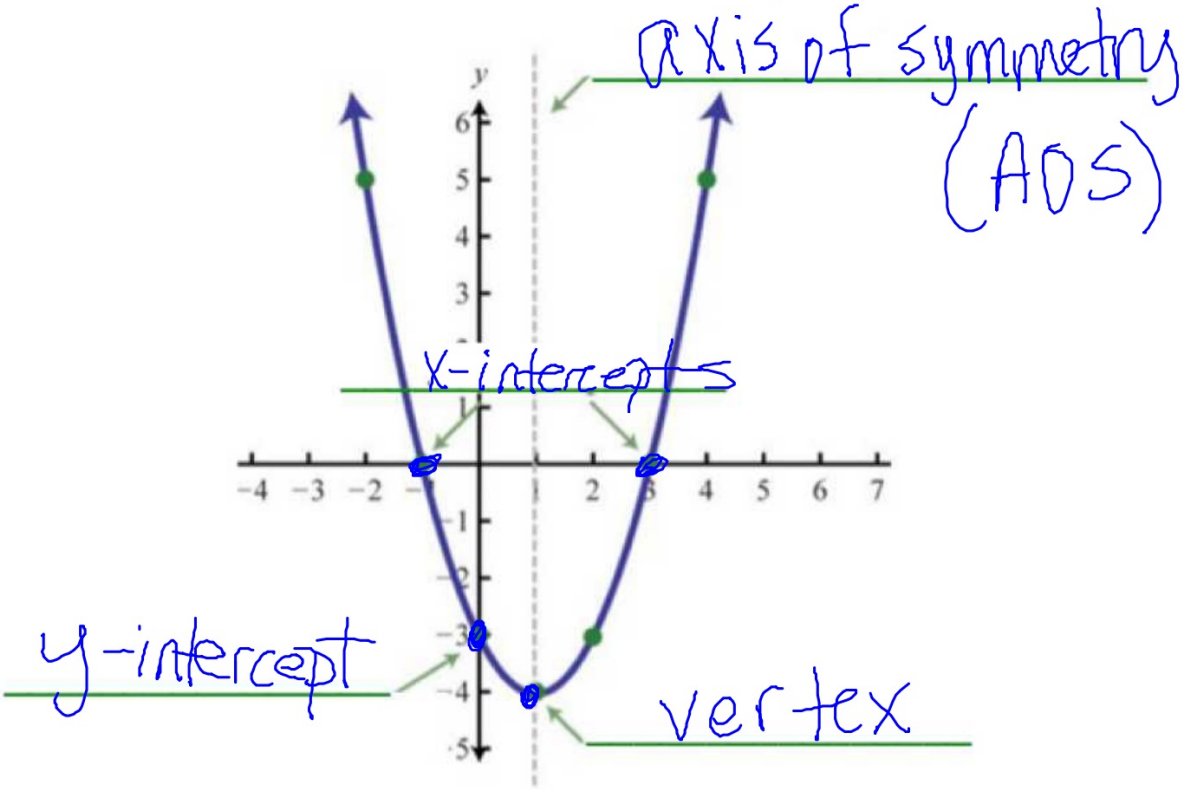
where:

a $\neq 0$

b $\in \mathbb{R}$

c $\in \mathbb{R}$

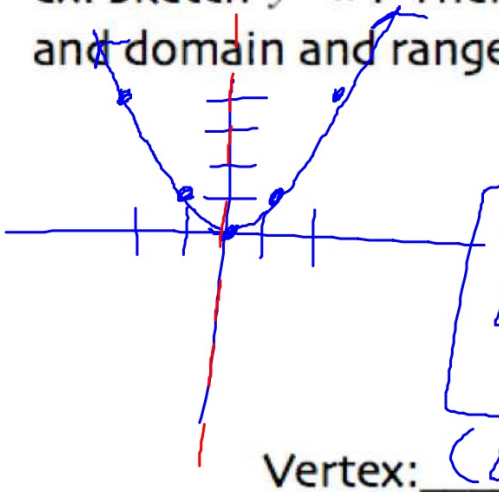
* The graph of a quadratic is called a parabola.



Parent Function - the simplest form of a function

Parent Quadratic Function: $y = x^2$

ex: Sketch $y = x^2$. Then state the vertex, axis of symmetry and domain and range in set notation.



x	y
-2	4
-1	1
0	0
1	1
2	4

Vertex: (0,0) AOS: x = 0

Domain: (-∞,∞) Range: [0,∞)

To graph a quadratic function in standard form:

- Find the vertex.

$$\boxed{\text{Vertex: } x = \frac{-b}{2a}}$$

- Plot at least two other points, one on each side of the vertex.

ex: Sketch, then state the vertex, axis of symmetry and domain and range in the indicated notation.

a) $y = 3x^2 - 12x + 8$

find vertex

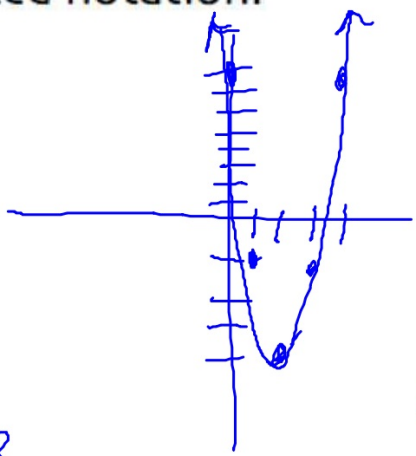
$x = \frac{-b}{2a} = \frac{-(-12)}{2(3)} = 2$

$a = 3$

$b = -12$

$y = 3(2)^2 - 12(2) + 8$

$y = -4$



x	y
0	8
1	-1
2	-4
3	-1
4	8

Vertex: $(2, -4)$ AOS: $x = 2$

(INT) Domain: $(-\infty, \infty)$ Range: $[-4, \infty)$

b) $y = -x^2 - 6x - 4$

$a = -1$

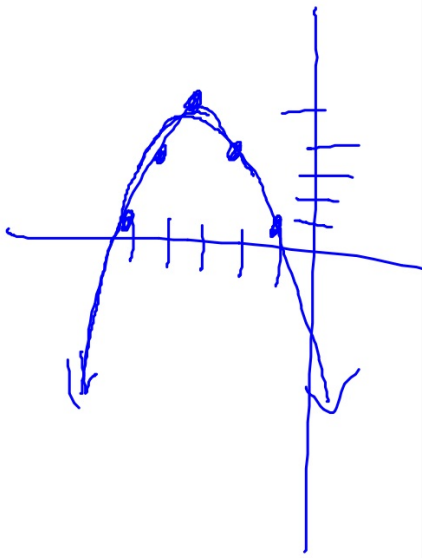
$b = -6$

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

$y = -(-3)^2 - 6(-3) - 4$

$y = -9 + 18 - 4 = 5$

x	y
-1	1
-2	4
-3	5
-4	4
-5	1



Vertex: $(-3, 5)$ AOS: $x = -3$

(SET) Domain: $\{x \mid x \in R\}$ Range: $\{y \mid y \leq 5\}$

ex: Consider the graph of: $y = ax^2 + bx + c$

a) When does the graph open up?

$a > 0$

b)When does the graph open down?

$a < 0$

c) What is the axis of symmetry?

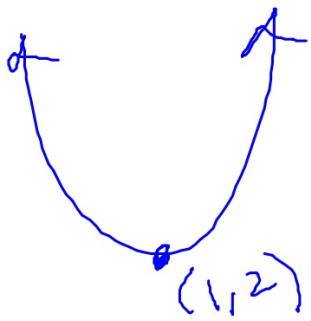
$x = \frac{-b}{2a}$

Maximum and Mimimum Values

* The maximum or mimimum of a parabola always occurs at the vertex.

*The maximum or mimimum value is the y-coordinate of the vertex.

"y"



min. value is 2

ex: Without graphing, consider the function: $y = -\frac{1}{2}x^2 + 3$

a) What is the direction of opening?

down

b)What is the axis of symmetry?

$x = 0$

c) What is the maximum/minimum value?

3

d) State the domain and range in interval notation.

D: $(-\infty, \infty)$ R: $(-\infty, 3]$

ex: The table below represents some points on the graph of a quadratic function.

x	a	-2	-1	0	1	6
y	45	-3	-4	-3	0	45

a) What is the direction of opening? UP

b)What is the maximum/minimum value of the quadratic function?

min value: -4

x	a	-2	-1	0	1	6
y	45	-3	-4	-3	0	45

c) What is the y-intercept?

(0, -3)

d) What are the x-intercepts?

(1, 0) (-3, 0)

e) What is the value of a? -8