

## 8 Algebra CC

**Essential Questions:** How do we determine the domain and range of a quadratic function?

How do we determine when the function is increasing? How do we determine when the function is decreasing?

**Do Now:** Complete the table with the correct terminology.

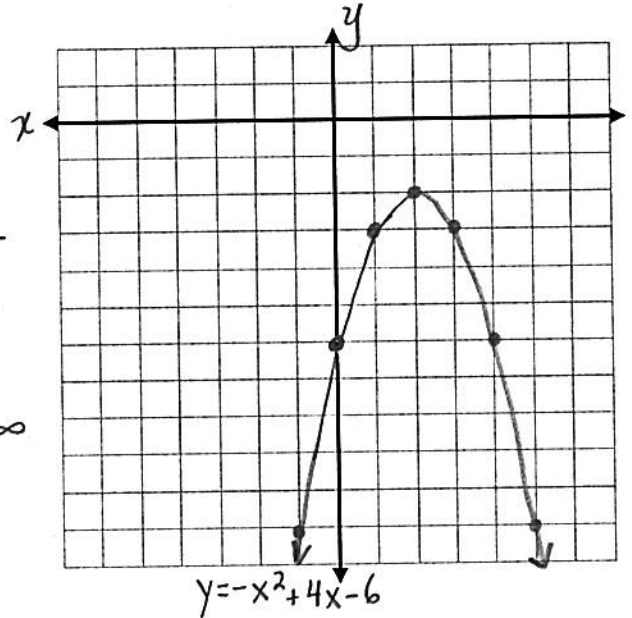
Domain	input	x-values
Range	output	y-values

1) Graph the quadratic function  $y = -x^2 + 4x - 6$

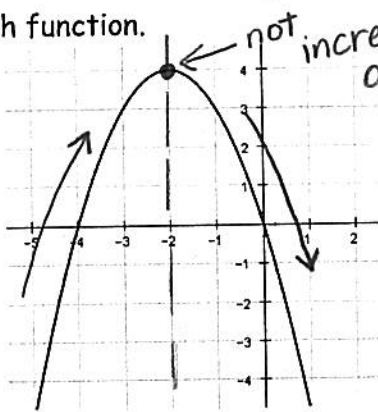
State the:  $x = -\frac{b}{2a}$   $x = \frac{-4}{2(-1)}$   $x = 2$

X	Y
-1	-11
0	-6
1	-3
2	-2
3	-3
4	-6
5	-11

- Vertex: (2, -2)
- Maximum or minimum maximum
- x-intercepts: none
- Zeros (roots): no real roots
- Domain:  $(-\infty, \infty)$  or  $-\infty < x < \infty$
- Range:  $(-\infty, -2]$  or  $y \leq -2$



2) Describe the end behavior of the following graphs. Describe the intervals for which the functions are increasing and the intervals for which they are decreasing. State the range of each function.

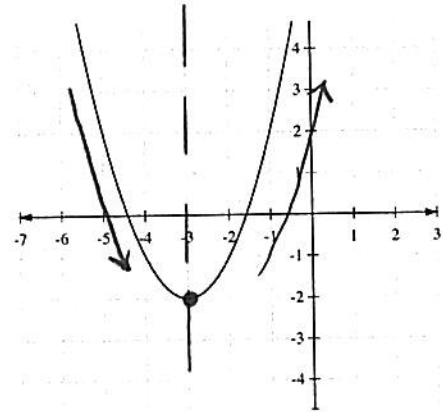


End behavior:  $-\infty$

Increasing:  $x < -2$

Decreasing:  $x > -2$

Range:  $y \leq 4$



End behavior:  $+\infty$

Increasing:  $x > -3$

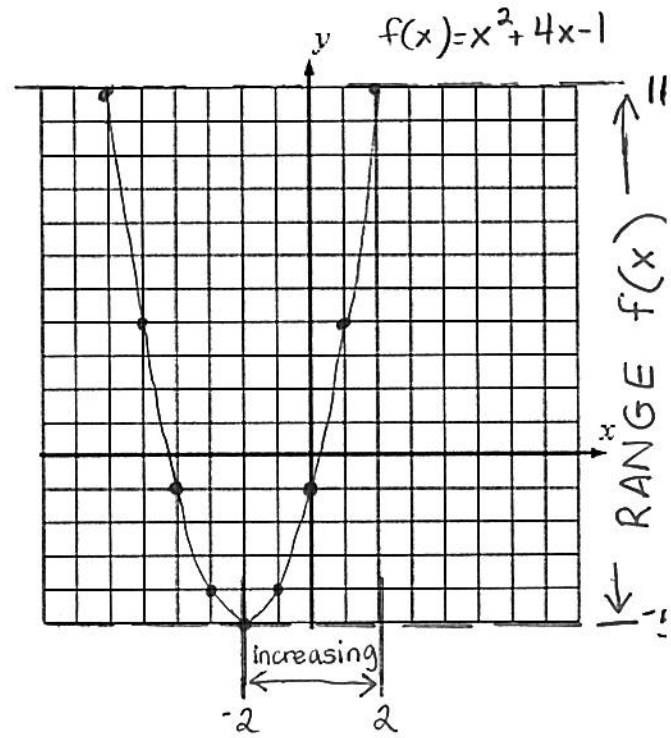
Decreasing:  $x < -3$

Range:  $y \geq -2$

3) For the quadratic function  $f(x) = x^2 + 4x - 1$  defined on the interval  $-6 \leq x \leq 2$ .

(a) Graph the function for the stated interval.

$x = \frac{-b}{2a}$	$x$	$f(x)$
	-6	11
	-4	-1
$x = \frac{-4}{2(1)}$	-2	-5
	0	-1
$x = -2$	2	11



(b) State the range of the function.

$$[-5, 11] \quad \text{or} \quad -5 \leq f(x) \leq 11$$

(c) State the interval over which  $f(x)$  is increasing.

$$(-2, 2] \quad \text{or} \quad -2 < x \leq 2$$

(d) Is  $x = 0$  part of an interval where  $f(x) > 0$  or  $f(x) < 0$ ?  
Explain your choice.

$$(x, f(x))$$

$$(0, -1)$$

↑

$$f(x) < 0$$