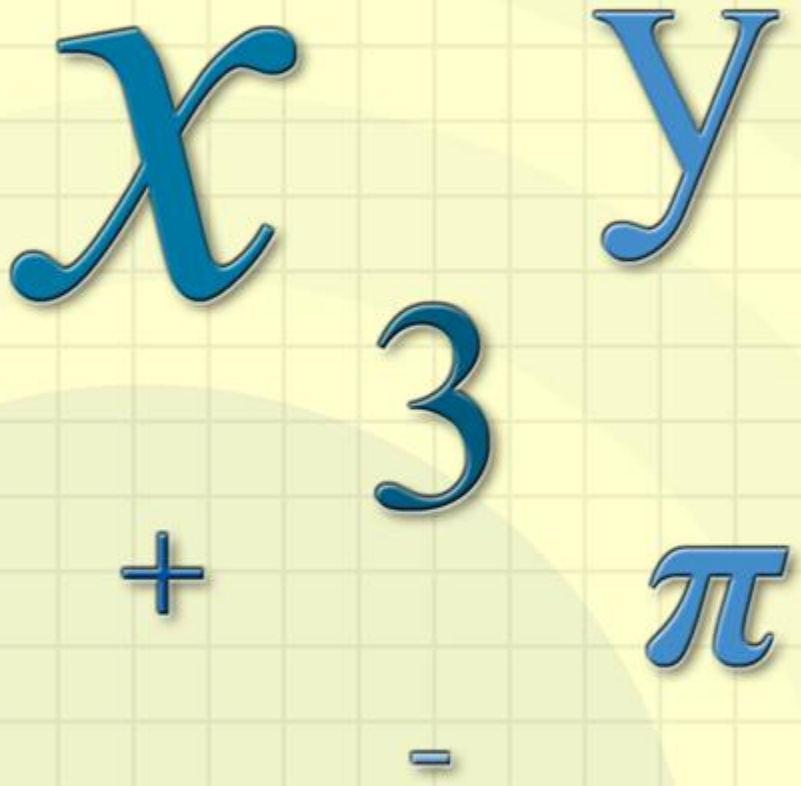
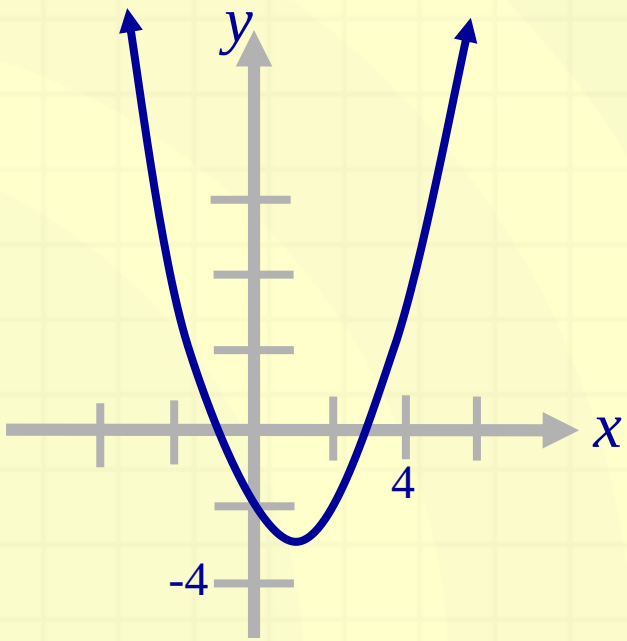


1.5 Graphs of Functions

The **graph of a function** f is the collection of ordered pairs $(x, f(x))$ where x is in the domain of f.

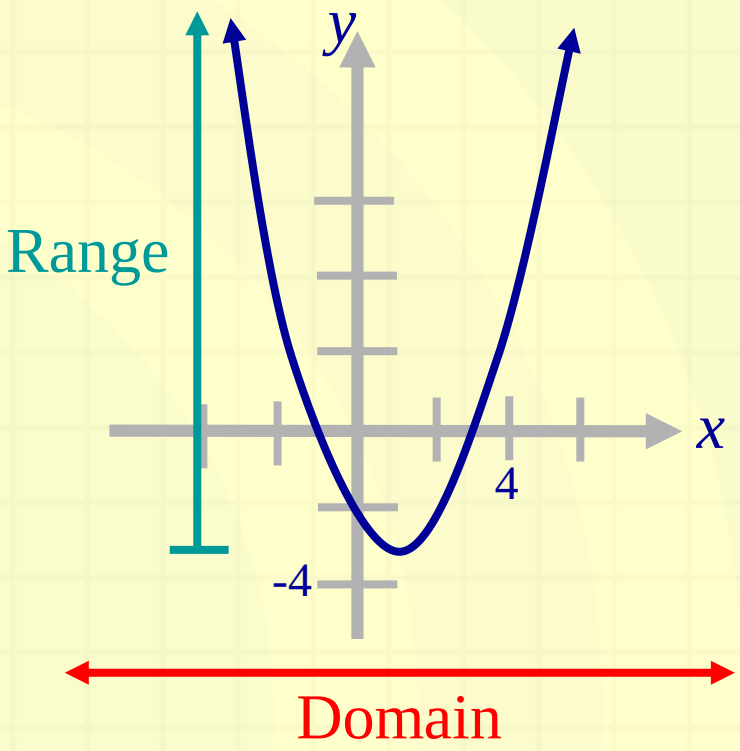
$$f(x) = (x - 1)^2 - 3$$



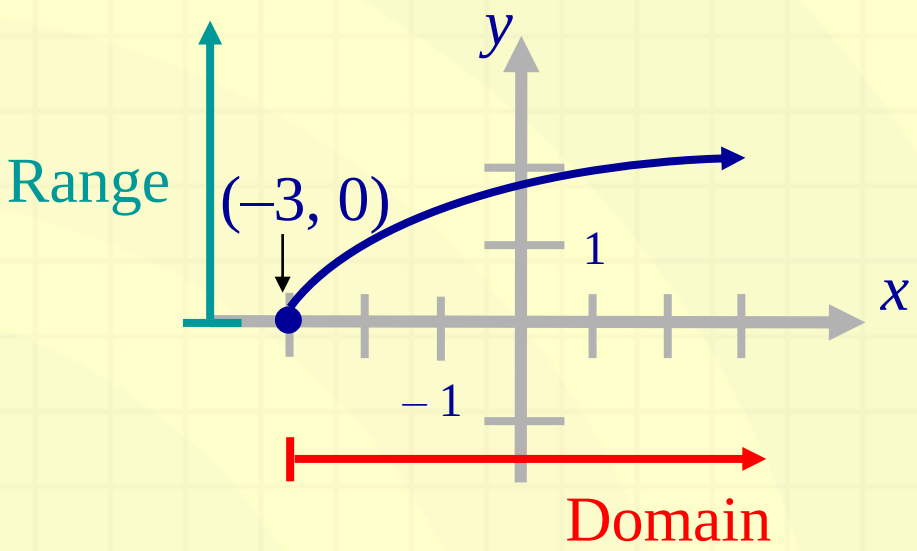
x	f(x)
-2	6
-1	1
0	-2
1	-3
2	-2
3	1

The **domain** of the graph is the set of x values for which a corresponding y value exists.

The **range** of the graph is the set of y values which correspond to the x values in the domain.



Example: Find the domain and range of the function $f(x) = \sqrt{x+3}$ from its graph.

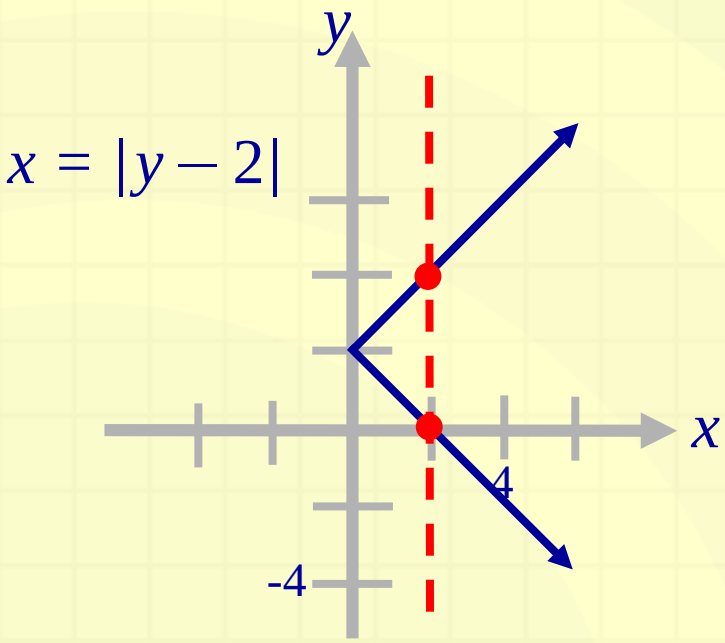


The domain is $[-3,\infty)$.

The range is $[0,\infty)$.

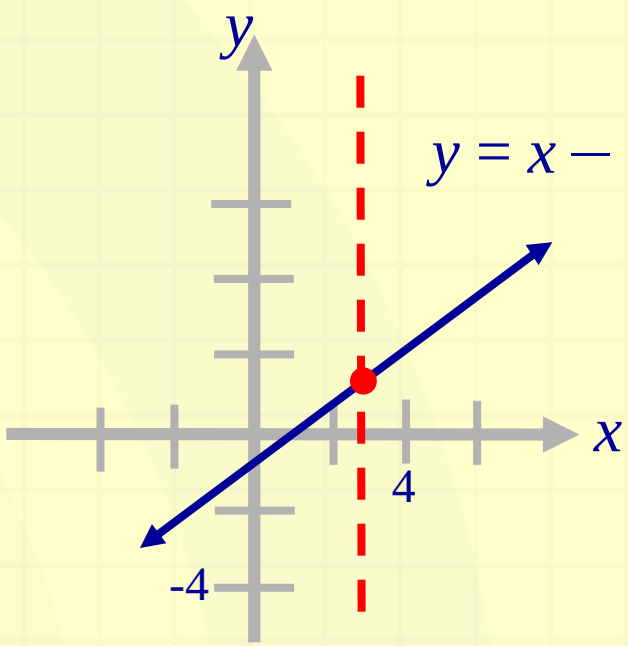
Vertical Line Test

A relation is a **function** if no vertical line intersects its graph in more than one point.



This graph does **not** pass the vertical line test.

It is <u>not</u> a function.



This graph passes the vertical line test.

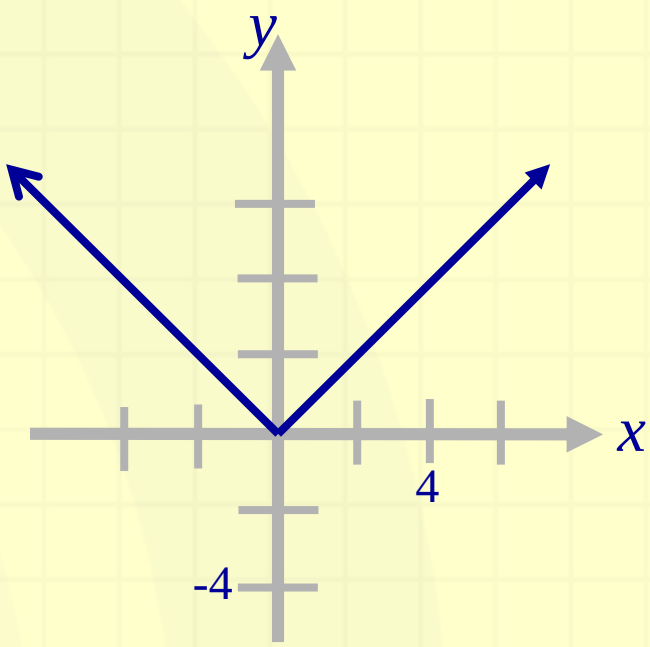
It is a function.

Graph the following on the same graph

Graph y = -x from -∞ to 0.

Graph y = x from 0 to ∞.

$$f(x) = \begin{cases} -x, & x \le 0 \\ x, & x \ge 0 \end{cases}$$

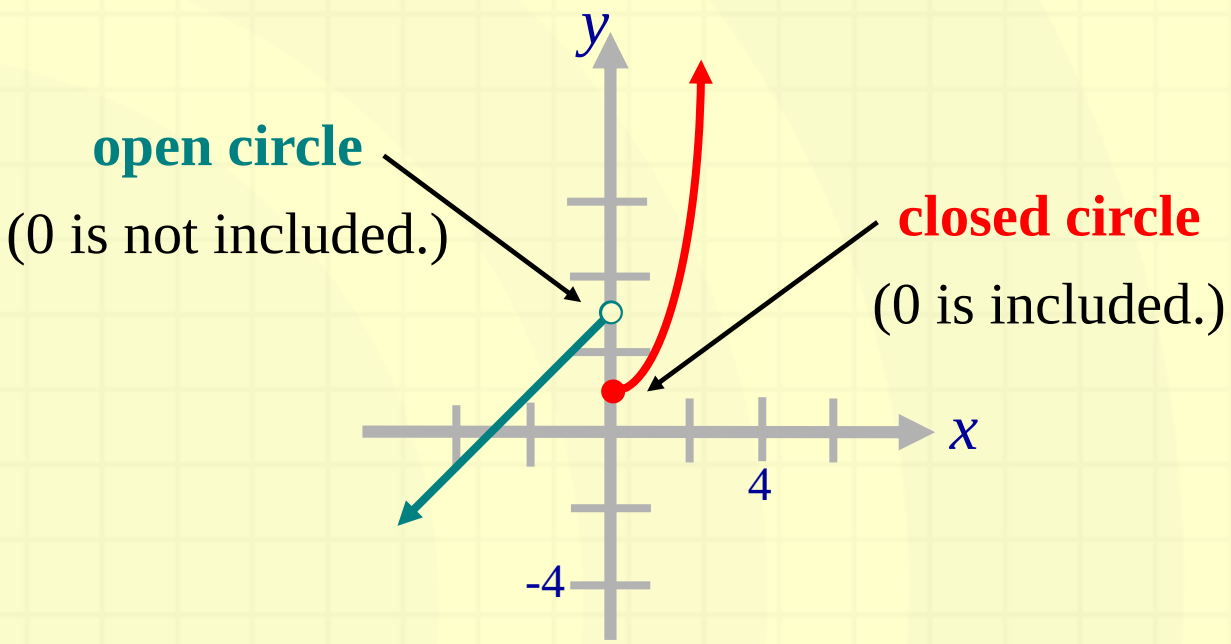


A **piecewise-defined function** is composed of two or more functions.

$$f(x) = \begin{cases} 3 + x, & x < 0 \\ x^2 + 1, & x \geq 0 \end{cases}$$

Use when the value of x is less than 0.

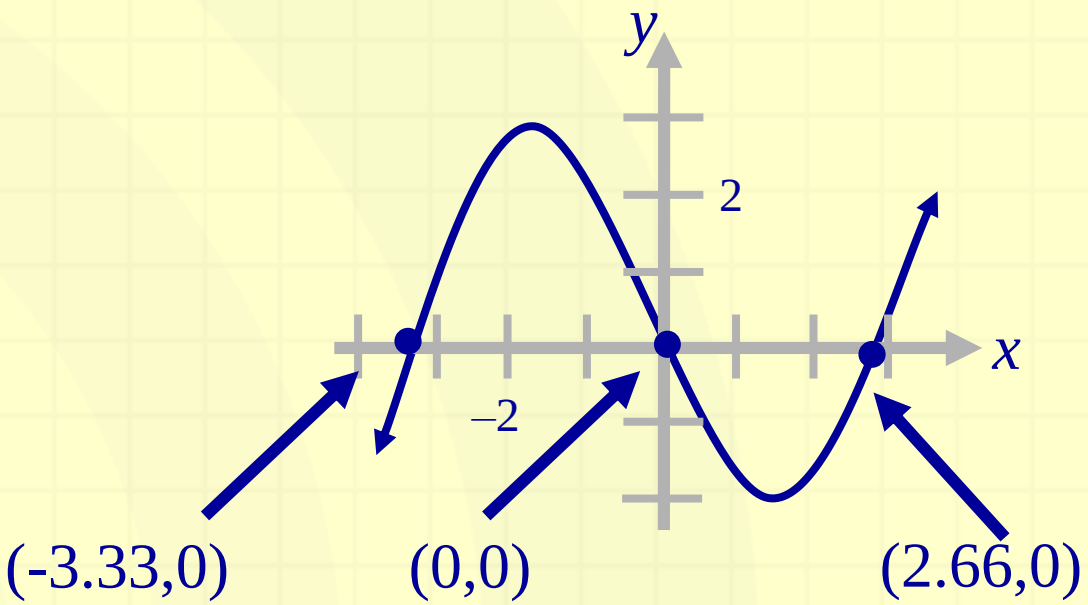
Use when the value of x is greater or equal to 0.



Zeros of a Function

- The zeros of a function are the x-values for which $f(x)$ or $y = 0$.
- They are the x-intercepts.

$$f(x) = \frac{1}{4}x^3 + \frac{1}{6}x^2 - \frac{20}{9}x$$



Find the zero's of the following functions

1. $f(x) = 3x^2 + x - 10$

$(3x - 5)(x + 2)$

$x = -2, \frac{5}{3}$

2. $g(x) = \sqrt{10 - x^2}$

$0 = 10 - x^2$

$x^2 = 10$

$x = \pm\sqrt{10}$

3. $h(x) = \frac{2x - 3}{x + 5}$

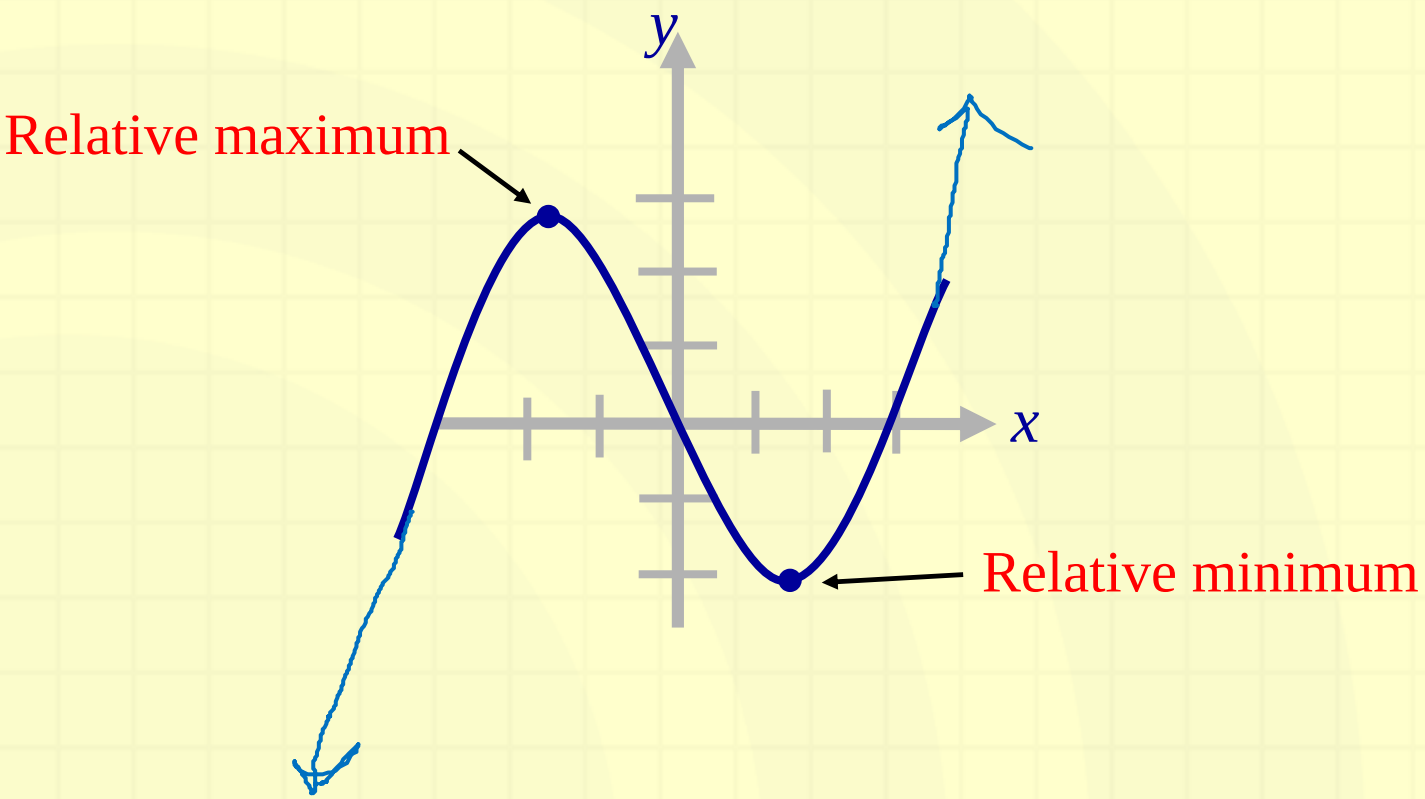
$(x+5)$

$0 = 2x - 3$

$3 = 2x$

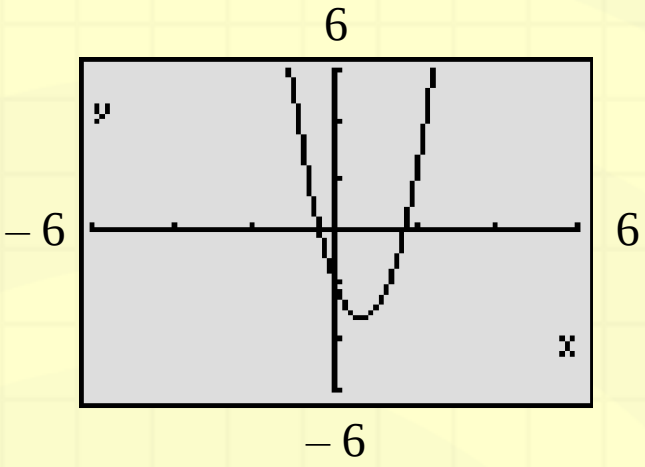
$x = \frac{3}{2}$

Relative Maximum and Minimum Values

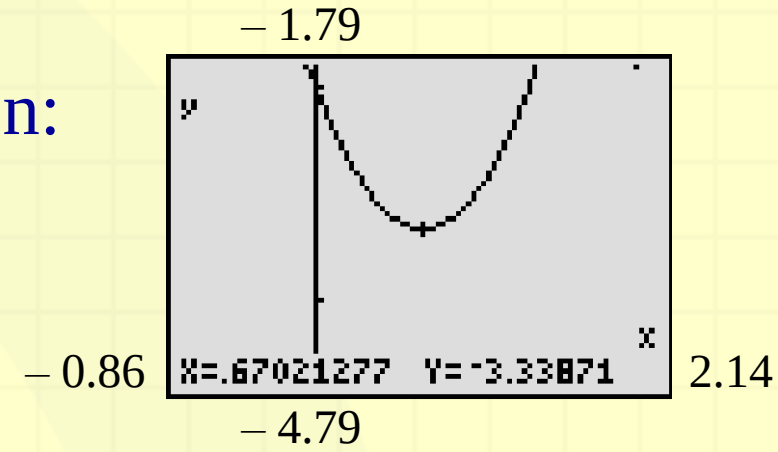


Approximate the relative minimum of the function

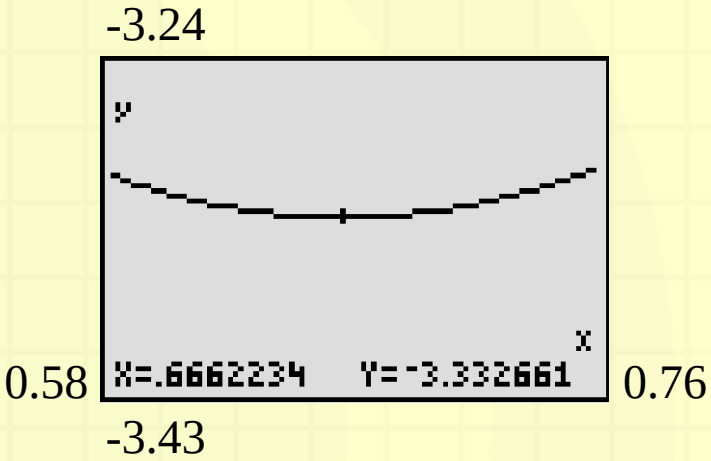
$$f(x) = \frac{3}{2}x^2 - 2x - \frac{8}{3}$$



Zoom In:



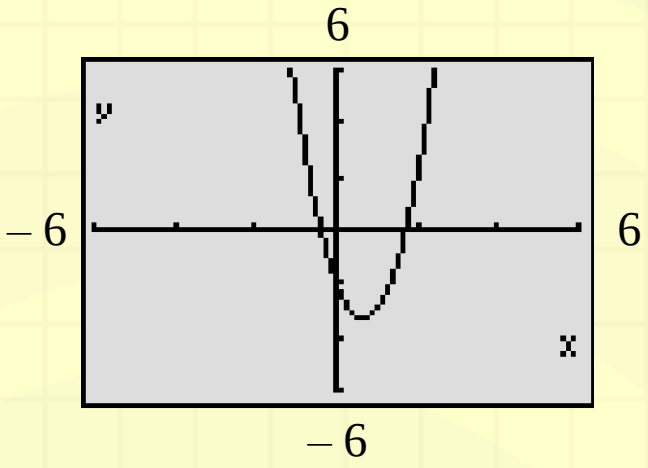
Zoom In:



The approximate minimum is (0.67, –3.33).

Find the exact value of the relative minimum of

$$f(x) = \frac{3}{2}x^2 - 2x - \frac{8}{3}$$



Press:

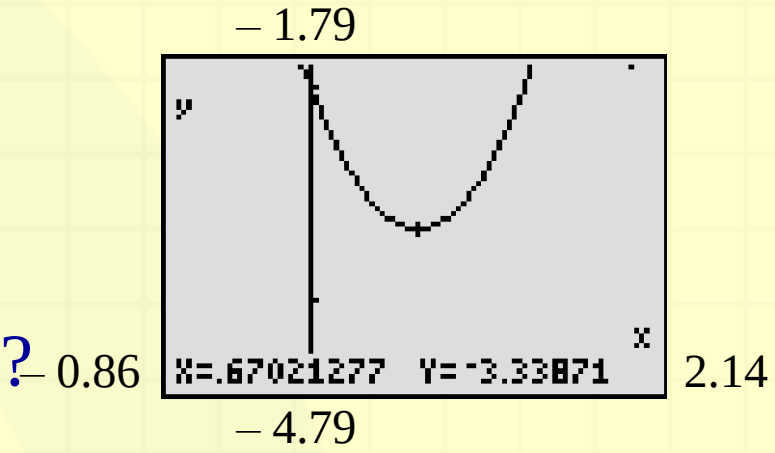
2nd Calc

3:minimum

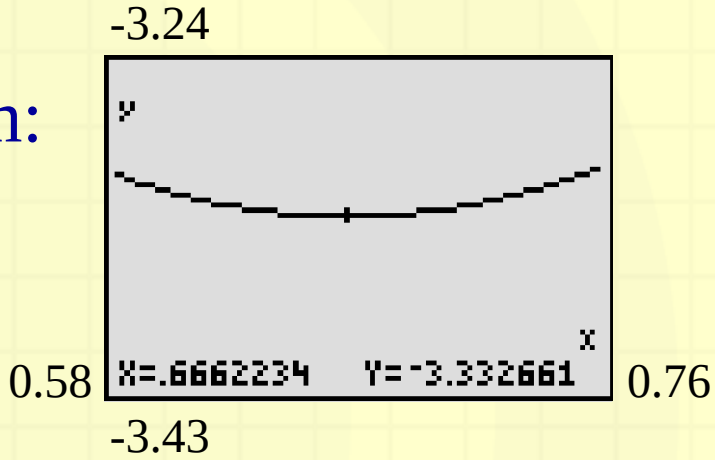
Left Bound?

Right Bound?

Guess?



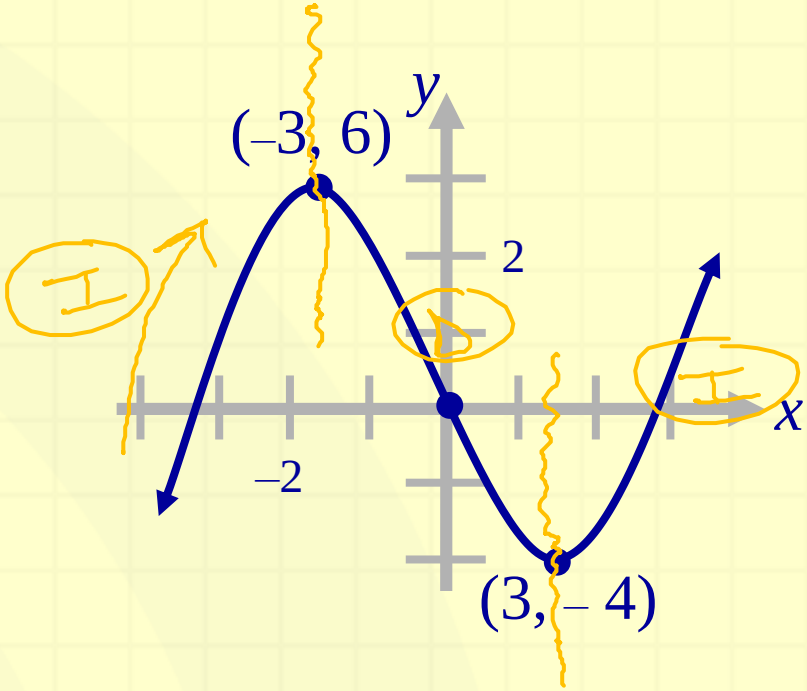
Minimum:



The exact value is (0.67, –3.33).

The graph of $y = f(x)$:

- **increases** on $(-\infty, -3)$,
- **decreases** on $(-3, 3)$,
- **increases** on $(3, \infty)$.



Inc: $(-\infty, -3) \cup (3, \infty)$

Classwork

Page 61 #1-5, 7, 26, 27, 44, 45

Find D, R, Inc, Dec, Min, Max

Homework

- Pg 61 # 6, 8- 20, 22, 24, 31-38