Unit 3
Polynomial Functions

Characteristics of Functions

Range (y)

Range is all the **outputs** of a function (**y- values**)

Range can VARY:

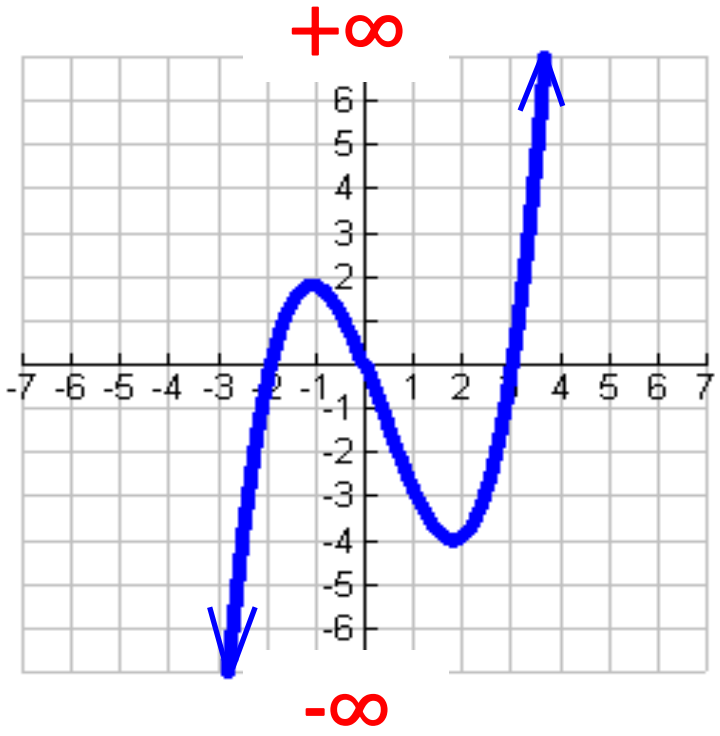
- ALL REAL NUMBERS $(-\infty, \infty)$
- Lower boundary to infinity $[LB, \infty)$
- Negative infinity to upper boundary $(-\infty, UB]$

Read the graph from the bottom to the top.

RANGE

How do you find the **RANGE** of a graphed function?

Read the graph from the bottom to the top of the graph. Use y-values to describe where the graph begins and where the graph ends.



range: **(-∞, +∞)**

Absolute Extrema: Absolute Minimum and Absolute Maximum

*An **absolute maximum** point is a point where the function obtains its greatest possible y-value.

*Similarly, an **absolute minimum** point is a point where the function obtains its least possible y-value.

***Write as an ordered pair**.

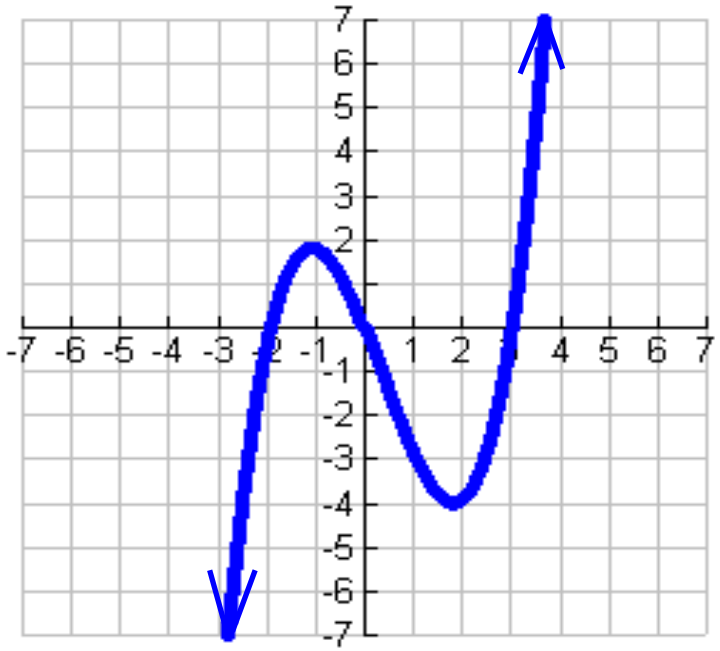
***Read the graph from the bottom to the top.**

***If the absolute maximum or minimum has arrows, then there is NO highest point and/or lowest point.**

ABSOLUTE MAXIMUM

How do you find the **MAXIMUM** of a graphed function?

Find the highest point on the graph. If the highest point is an arrow, then there is no maximum.

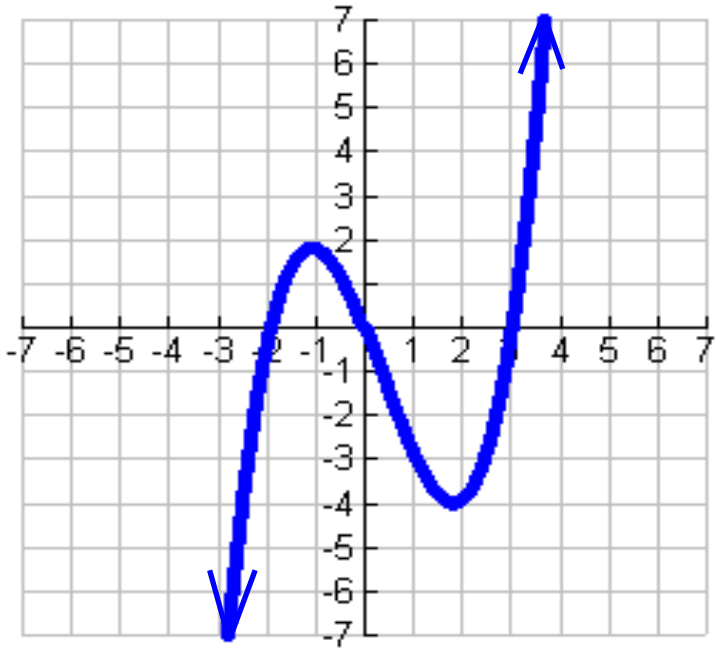


Absolute maximum: **NONE**

ABSOLUTE MINIMUM

How do you find the **MINIMUM** of a graphed function?

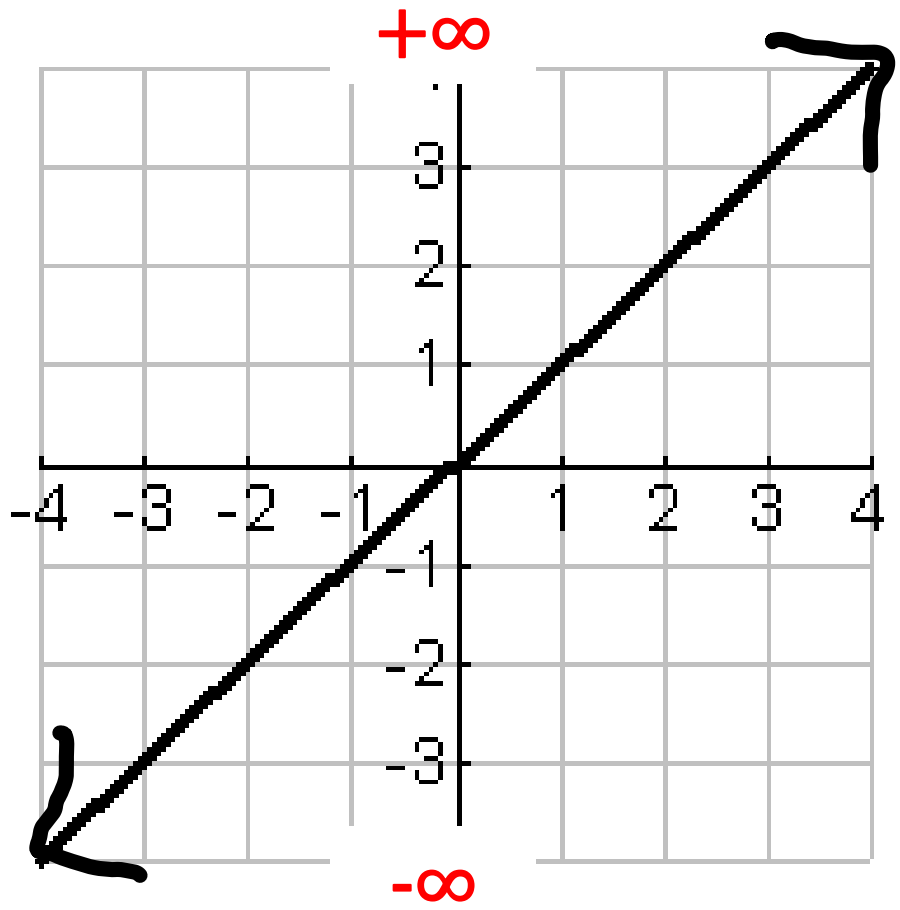
Find the lowest point on the graph. If the lowest point is an arrow, then there is no minimum.



Absolute Minimum: **NONE**

Linear

$$f(x) = x$$



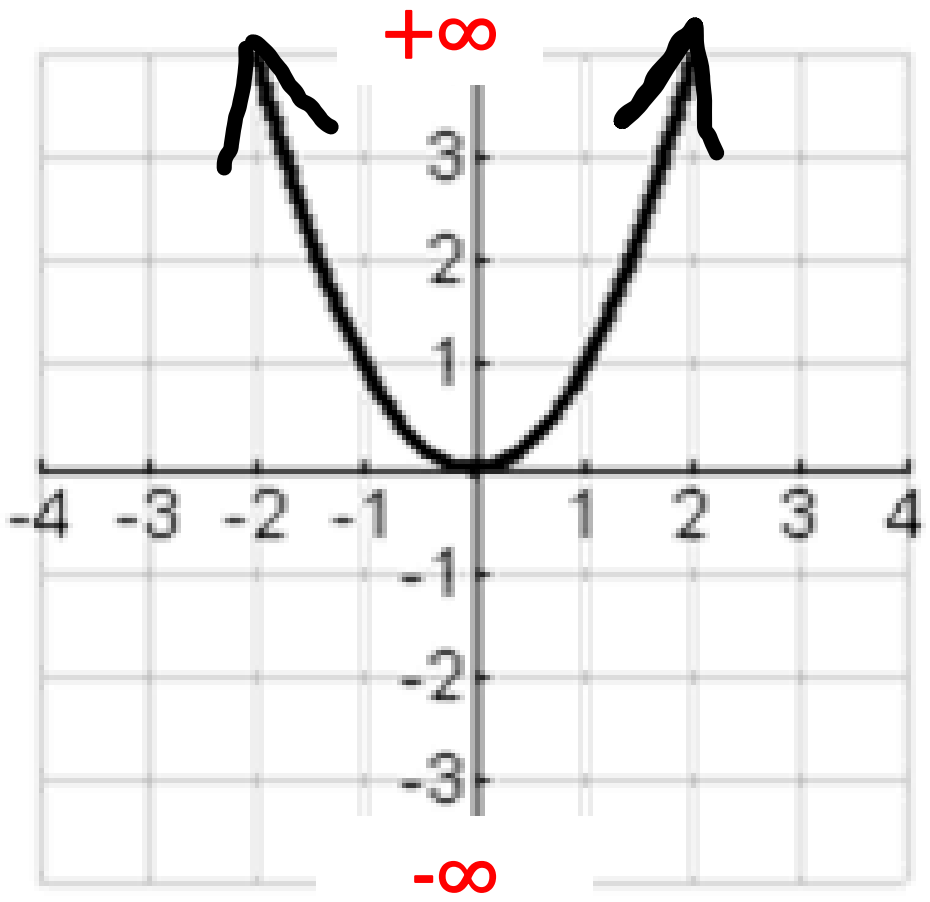
Range: **(-∞, +∞)**

Absolute Maximum: **NONE**

Absolute Minimum: **NONE**

Quadratic

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



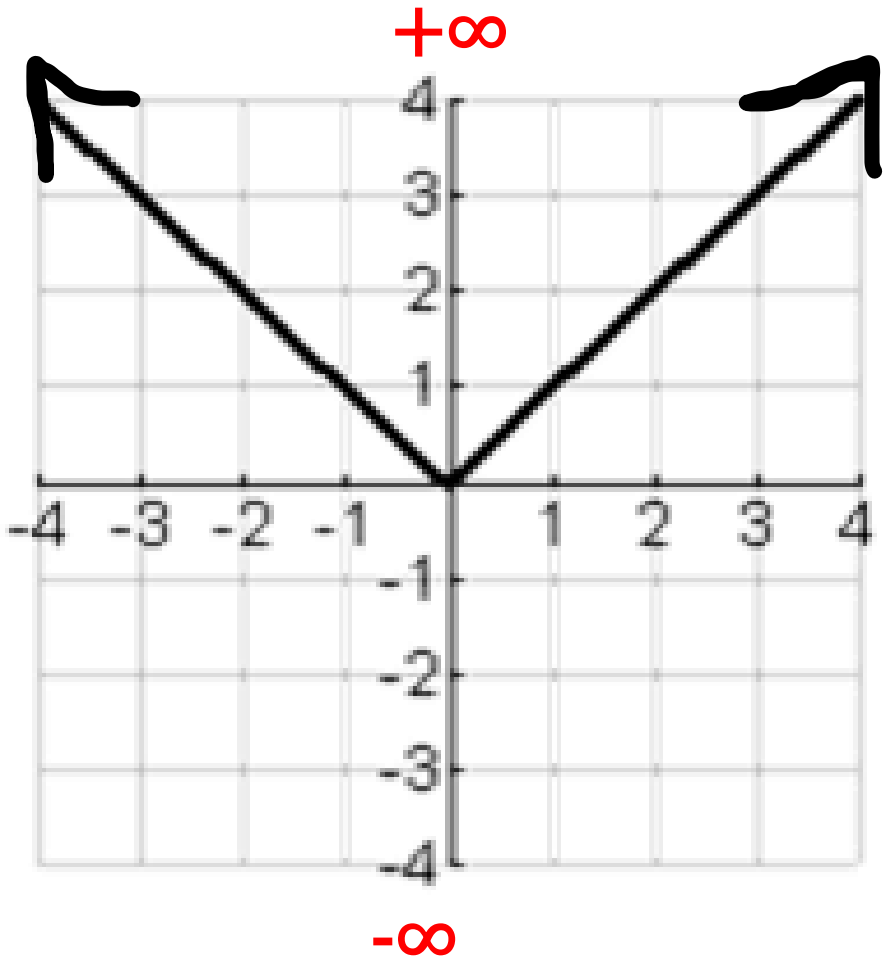
Range: **[0, +∞)**

Absolute Maximum: **NONE**

Absolute Minimum: **(0, 0)**

Absolute Value

$f(x) = |x|$



Range: **[0, +∞)**

Absolute Maximum: **NONE**

Absolute Minimum: **(0, 0)**

Types of Maximum and Minimum (Extrema)

- Maximum
  - **Absolute** , THE highest point
  - **Relative**, the 2nd, 3rd, 4th, etc. highest points (given an interval)
- Minimum
  - **Absolute**, THE lowest point
  - **Relative**, the 2nd , 3rd , 4th , etc. lowest points (given an interval)

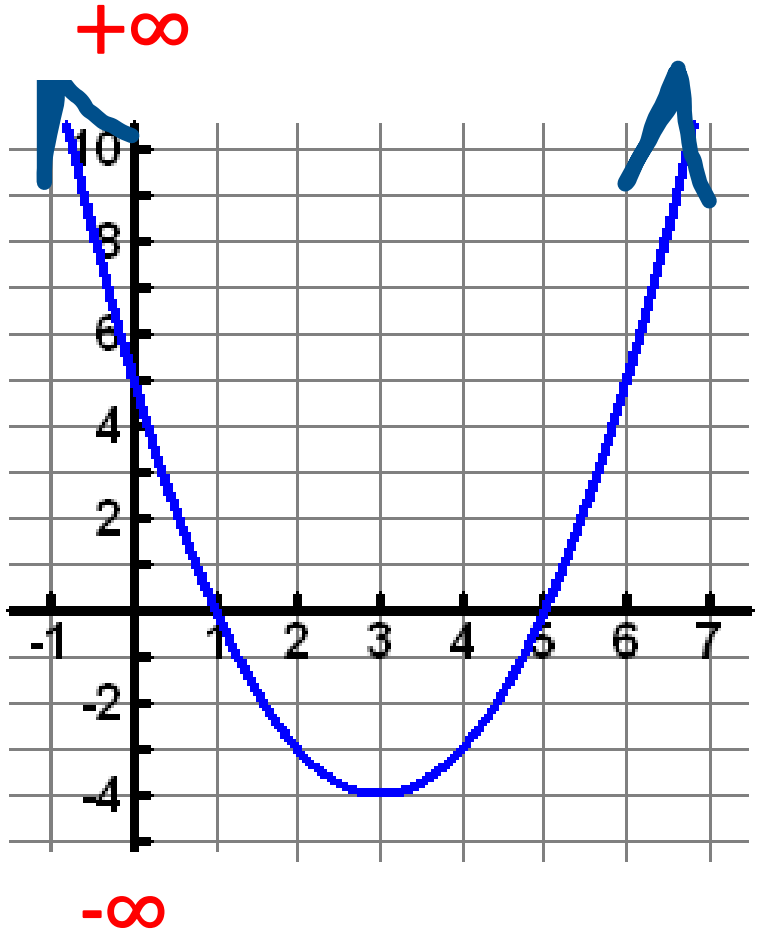
Determine the Extrema:

Absolute Max: **NONE**

Absolute Min: **(3, -4)**

Relative Max: **NONE**

Relative Min: **NONE**



Determine the Extrema:

Absolute Max: **NONE**

Absolute Min: **NONE**

Relative Max: **(-2, 2)**

Relative Min: **(1, -4.9)**