Welcome to class! Hope you are having a terrific Tuesday!

-All cell phones in holder

Take out homework sheet.

Solve

$$x^2 + 144 = 0$$
$$-144 \quad -144$$
$$\sqrt{x^2} = \sqrt{-144}$$

$x = \pm 12i$

Describe the transformations by completing the table and then graph the given function using the parent graph and transformations as your guide. $f(x) = -(x-1)^2 + 4$

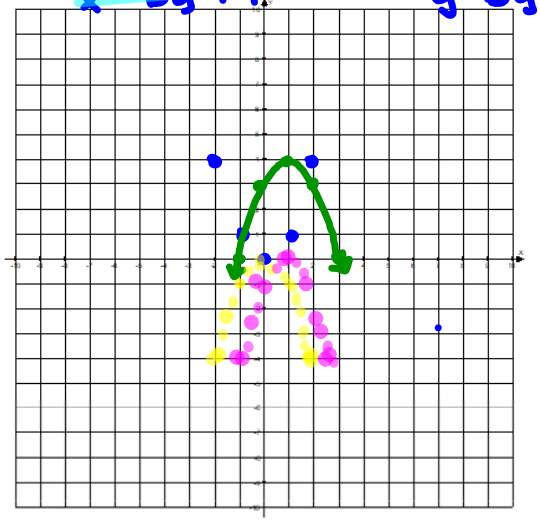
Parent Function	Reflection across x-axis?	Vertical Stretch? Shrink? What's the scale factor?	Horizontal Shift Right? Left? How many units?	Vertical shift Up? Down? How many units?
$y = x^2$	yes	None	Right 1	Up 4

Change y opposite

x by +1

y by +4

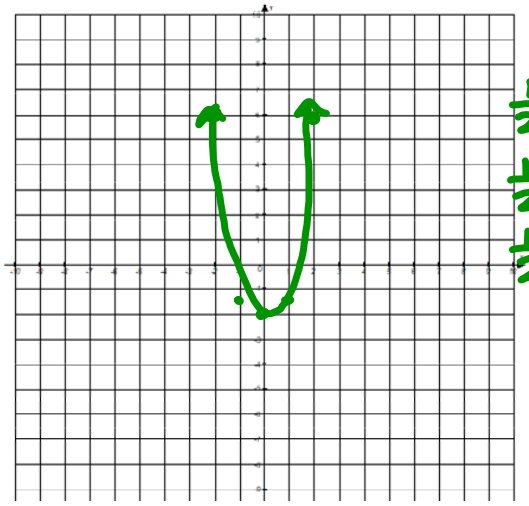
Key Points on parent function		Transformed Points to create the graph of your function	
x	y	x	y
-2	4	-1	0
-1	1	0	3
0	0	1	4
1	1	2	3
2	4	3	0



Describe the transformations by completing the table and then graph the given function using the parent graph and transformations as your guide. $f(x)=\frac{1}{2}x^4-2$

Parent Function	Reflection across x-axis?	Vertical Stretch? Shrink? What's the scale factor?	Horizontal Shift Right? Left? How many units?	Vertical shift Up? Down? How many units?
$y = x^4$	None	Compression by 1/2 change $\frac{1}{2}y$	None	down 2 $y-2$

Key Points on parent function		Transformed Points to create the graph of your function	
x	y	x	y
-2	16	-2	6
-1	1	-1	-1.5
0	0	0	-2
1	1	1	-1.5
2	16	2	6



$\frac{1}{2}(16)-2$

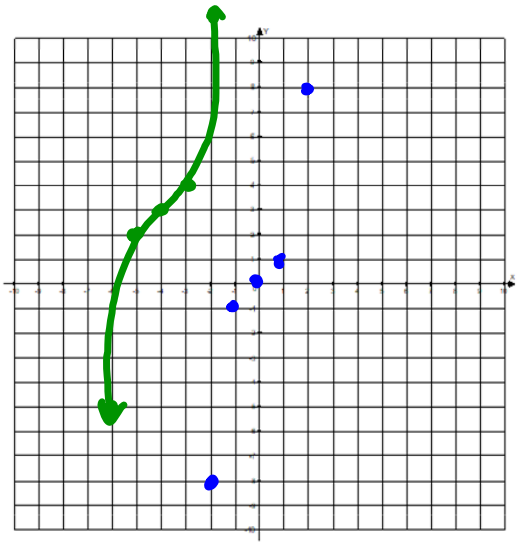
$\frac{1}{2}(1)-2$

$\frac{1}{2}(0)-2$

Describe the transformations by completing the table and then graph the given function using the parent graph and transformations as your guide. $f(x)=(x+4)^3+3$

Parent Function	Reflection across x-axis?	Vertical Stretch? Shrink? What's the scale factor?	Horizontal Shift Right? Left? How many units?	Vertical shift Up? Down? How many units?
y =				

Key Points on parent function		Transformed Points to create the graph of your function	
x	y	x	y
-2	-8	-6	-5
-1	-1	-5	+2
0	0	-4	3
1	1	-3	4
2	8	-2	11



Interval notation

$y > 5$ Bigger than 5 (not including 5) $(5, \infty)$

$y \geq 10$ Bigger than 10 (Include 10) $[10, \infty)$

$y < 3$ Smaller than 3 excluding 3 $(-\infty, 3)$

$y \leq -2$ Smaller than -2 Include -2 $(-\infty, -2]$

Start, Stop Smallest, largest $[\ ]$ = $(\ )$ not =

$3 < y \leq 15$ $(3, 15]$ $(\ )$ not = the number

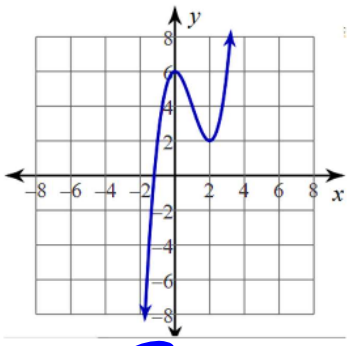
$2 < y < 9$ $(2, 9)$ ~~$[4, 7]$~~

Characteristics of Functions

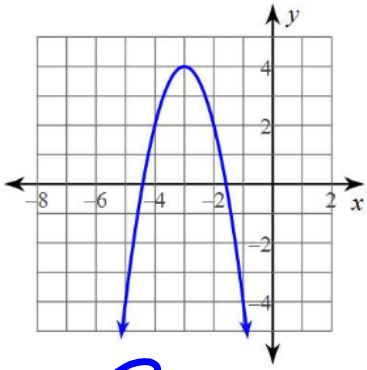
Domain: The set of all inputs. You look at the x-axis / x-values to find the domain. You will always look left to Right.

ℝ or $(-\infty, \infty)$ means all real number.

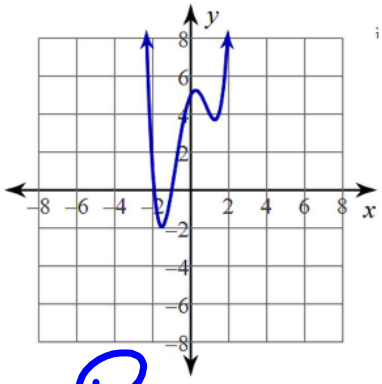
Examples:



ℝ



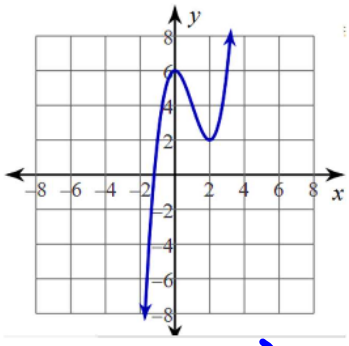
ℝ



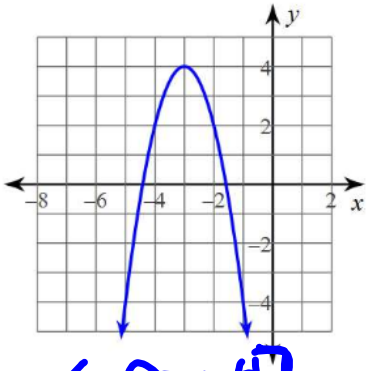
ℝ

Range: The set of all outputs. You look at the y-axis / y-values to find the range. You will always look down to up.

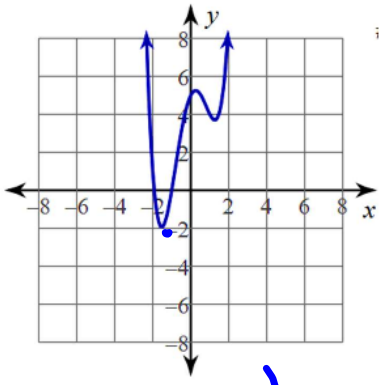
Examples:



$(-\infty, \infty)$



$(-\infty, 4]$



$[-2, \infty)$

x-intercepts: where the graph crosses the x- axis.

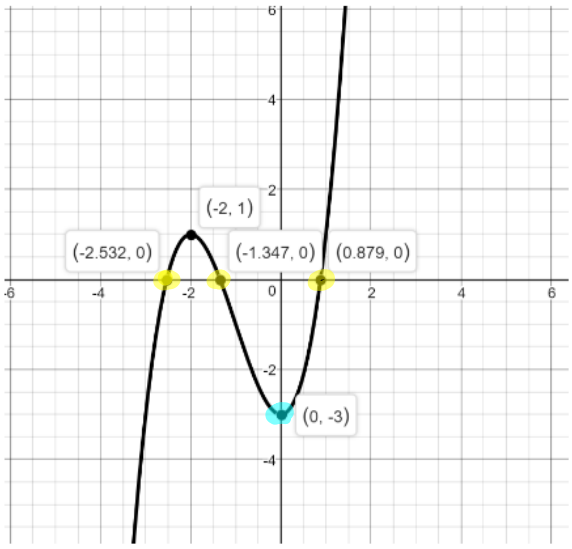
(x, 0)

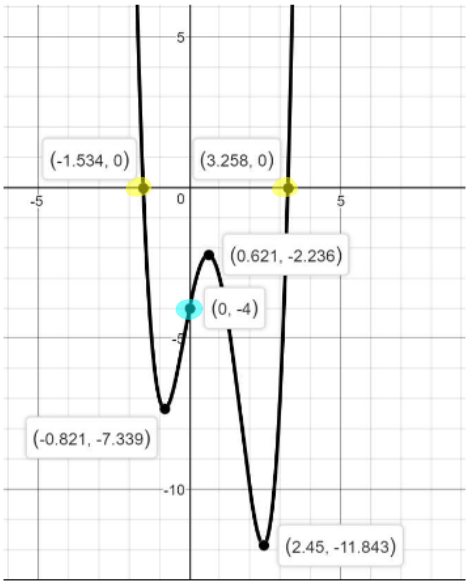
y-intercepts: where the graph crosses the y- axis.

(0, y)

zeros: same as the x-intercepts but written differently.

x = #





Examples 1

x-intercepts: (-2.532, 0) (-1.347, 0) (.879, 0)

y-intercepts: (0, -3)

zeros: x = -2.532, x = -1.347, x = .879

Examples 2

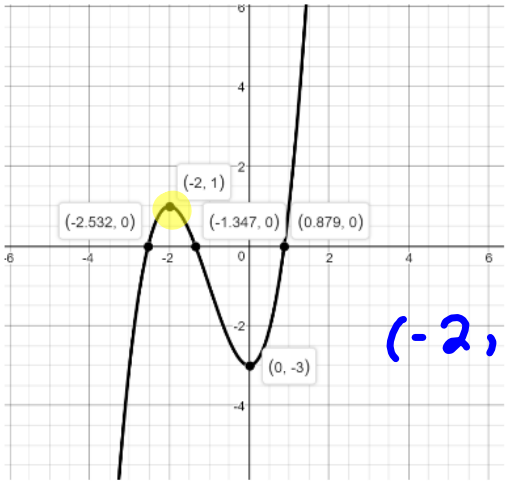
x-intercepts: (-1.534, 0) (3.258, 0)

y-intercepts: (0, -4)

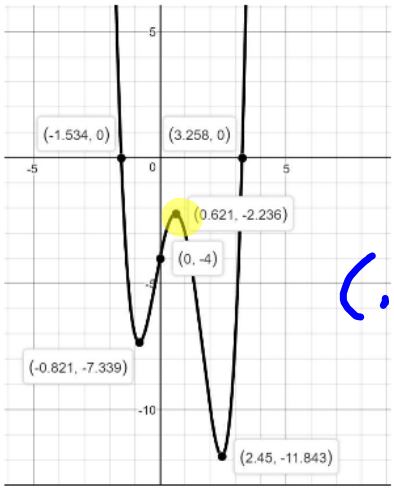
zeros: x = -1.534, x = 3.258

Relative Maximum: The highest point in a particular section of the graph (peak)

Examples:



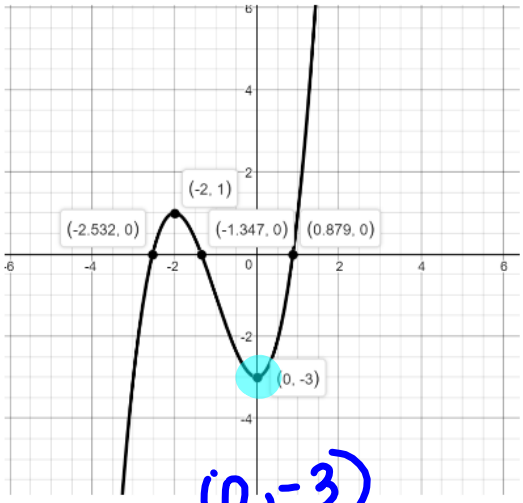
(-2, 1)



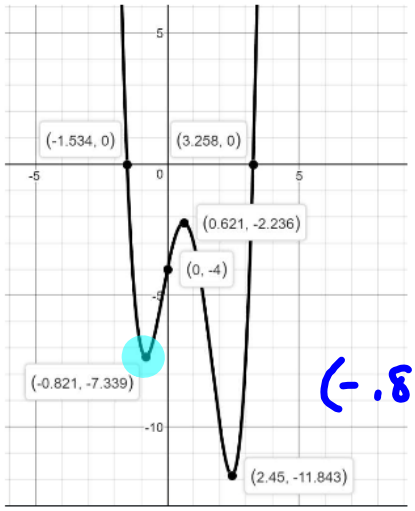
(.621, -2.236)

Relative Minimum: The lowest point in a particular section of the graph (dip)

Examples:



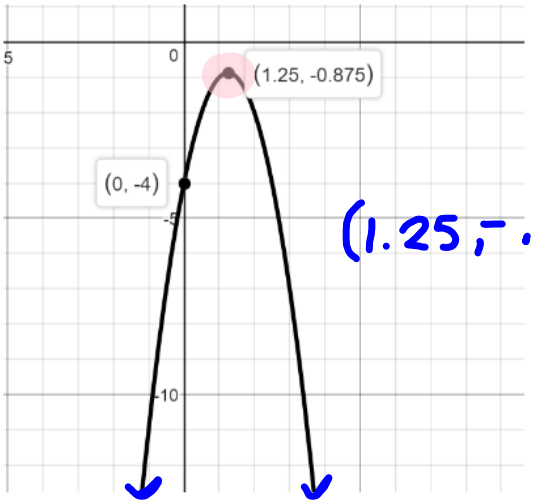
(0, -3)



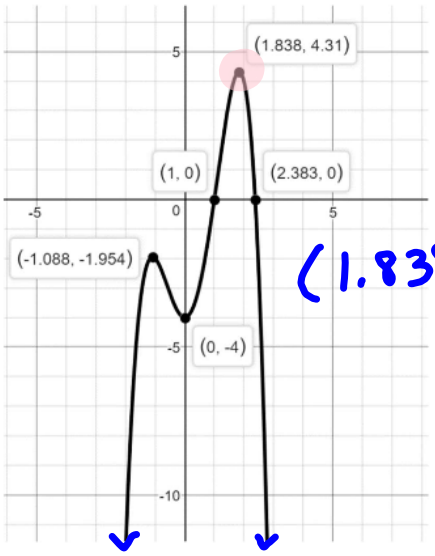
(-.821, -7.339)

Absolute Maximum: The highest point over the **ENTIRE** domain of the graph.

Examples:



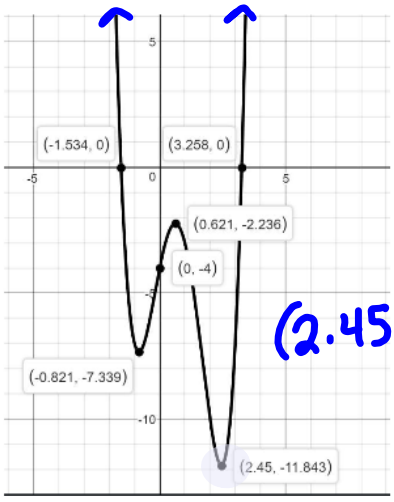
(1.25, -.875)



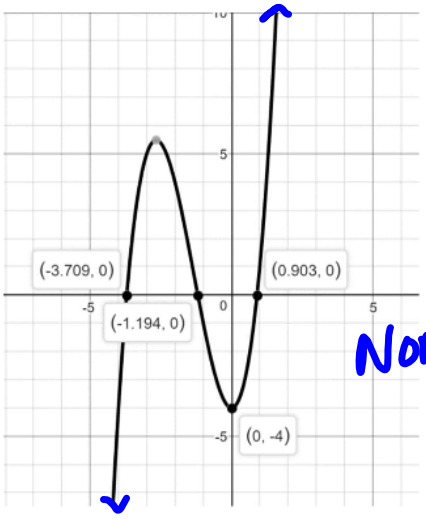
(1.838, 4.31)

Absolute Minimum: The lowest point over the **ENTIRE** domain of the graph.

Examples:



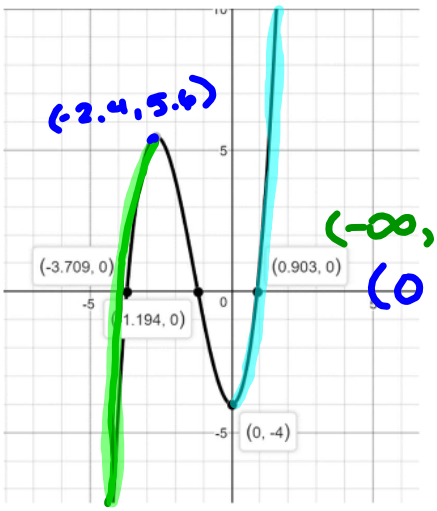
(2.45, -11.843)



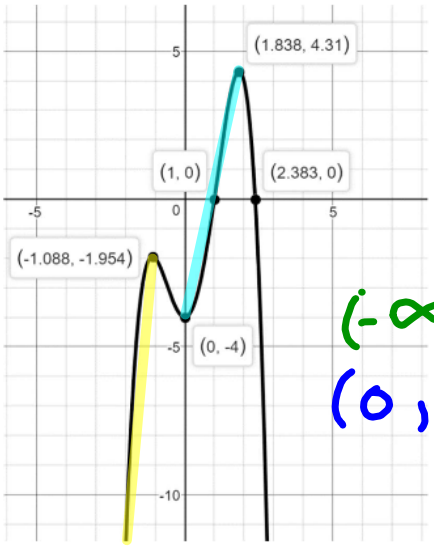
NONE

Interval of Increase: The set of values whereas x increases, f(x) increases.

Examples: x-values only



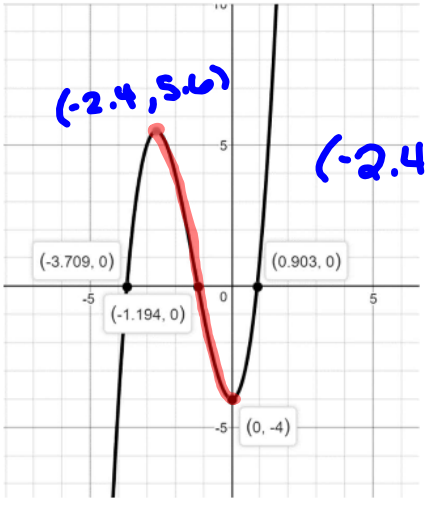
$(-\infty, -2.4)$
$(0, \infty)$



$(-\infty, -1.088)$
$(0, 1.838)$

Interval of Decrease: The set of values whereas x increases, f(x) decreases.

Examples:

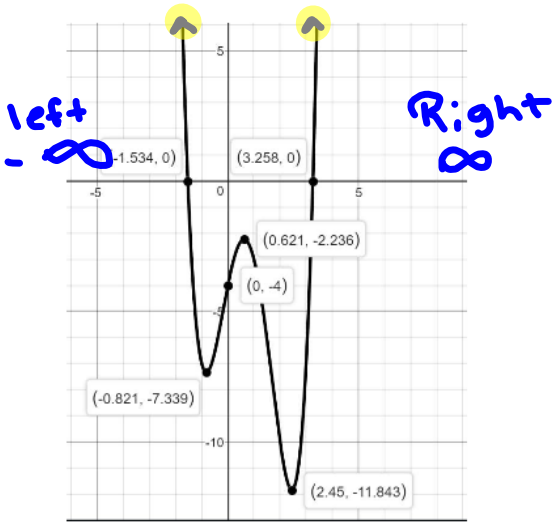


$(-2.4, 0)$

$(-1.088, 0)$
$(1.838, \infty)$

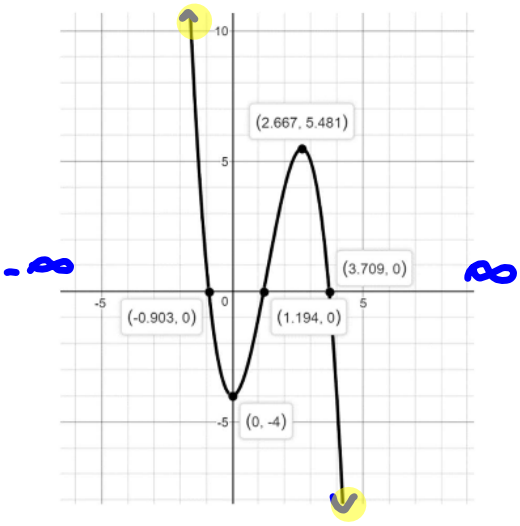
End Behavior: How does the graph act? Where do the arrows point?

Examples:



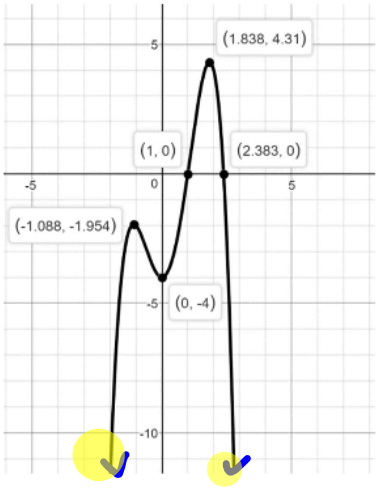
$x \to \underline{\infty}, f(x) \to \underline{\infty}$

$x \to \underline{-\infty}, f(x) \to \underline{\infty}$



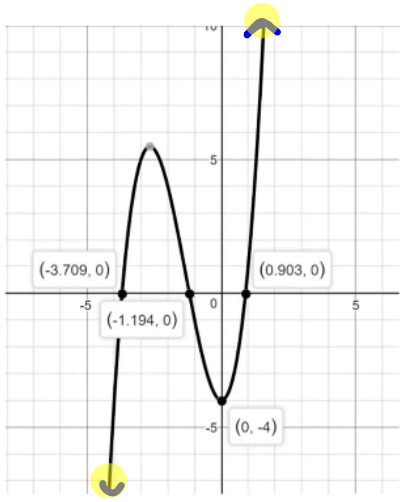
$x \to \underline{\infty}, f(x) \to \underline{-\infty}$

$x \to \underline{-\infty}, f(x) \to \underline{\infty}$



$x \to \underline{\infty}, f(x) \to \underline{-\infty}$

$x \to \underline{-\infty}, f(x) \to \underline{-\infty}$



$x \to \underline{\infty}, f(x) \to \underline{\infty}$

$x \to \underline{-\infty}, f(x) \to \underline{-\infty}$

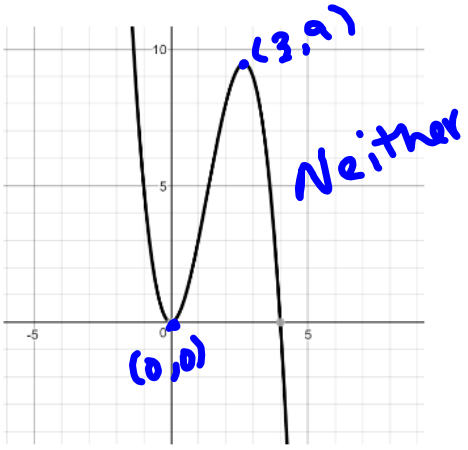
Symmetry:

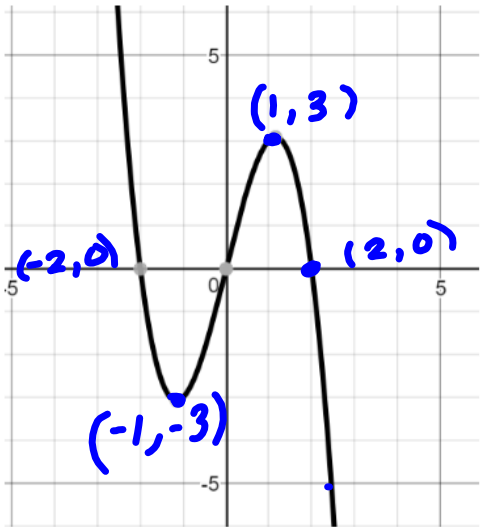
Even - symmetric to the y-axis $(x,y) \to (-x,y)$

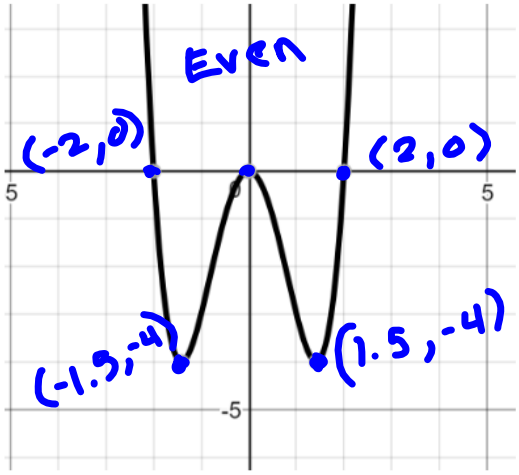
* Odd - symmetric to the origin $(x,y) \to (-x,-y)$

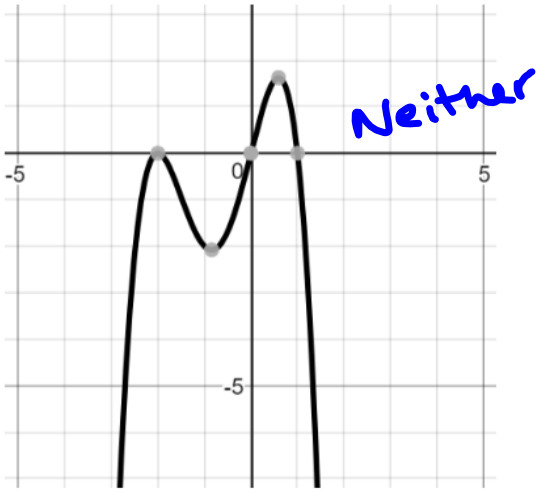
Neither – not symmetric to either y-axis or origin.

Examples:









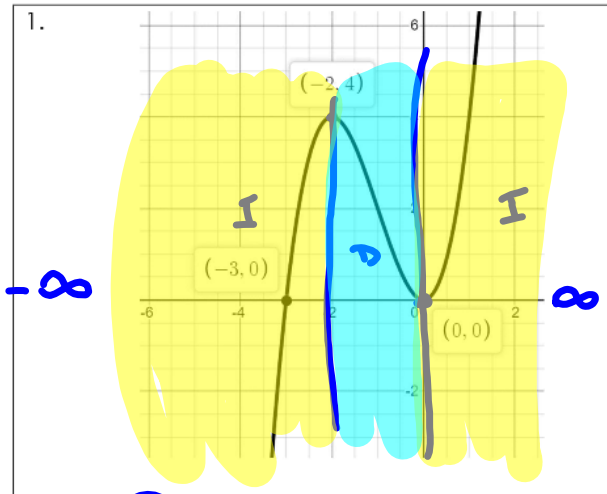
Characteristics of Polynomials

Practice

Name:_____

Date:_____ Block:_____

1.



Domain ℝ Range $(-\infty, \infty)$

Int. of Increase $(-\infty, -2)\ (0, \infty)$

Int. of decrease $(-2, 0)$

Relative Maximum $(-2, 4)$

Relative Minimum $(0, 0)$

Absolute Maximum NONE

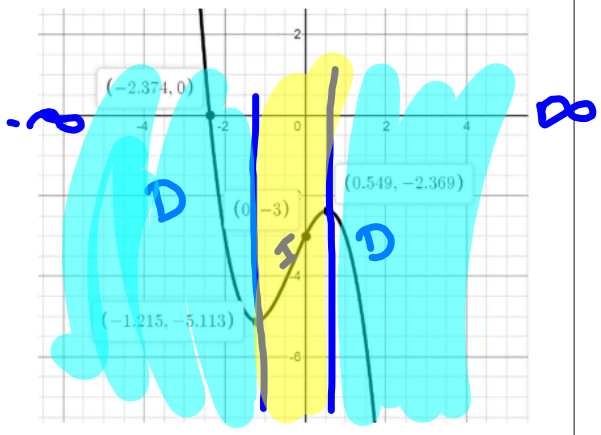
Absolute Minimum NONE

X intercept $(-3, 0)$ $(0, 0)$ y-intercept $(0, 0)$

Even/Odd/Neither Neither

End Behavior $x \to \infty, f(x) \to \infty$
$x \to -\infty, f(x) \to -\infty$

2.



Domain ℝ Range $(-\infty, \infty)$

Int. of Increase $(-1.215, .519)$

Int. of decrease $(-\infty, -1.215)\ (.519, \infty)$

Relative Maximum $(.519, -2.369)$

Relative Minimum $(-1.215, -5.113)$

Absolute Maximum None

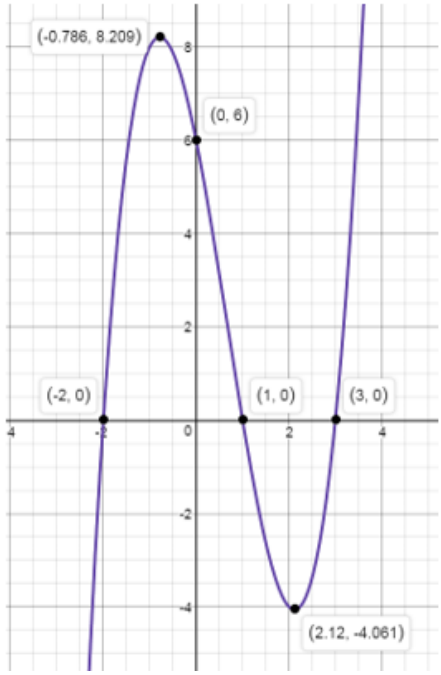
Absolute Minimum None

X intercept $(-2.374, 0)$ y-intercept $(0, -3)$

Even/Odd/Neither Neither

End Behavior $x \to \infty, f(x) \to -\infty$
$x \to -\infty, f(x) \to \infty$

1.



Domain TR Range $(-\infty, \infty)$

Int. of Inc. $(-\infty, -.786)$ $(2.12, \infty)$ Int. of dec. $(-.786, 2.12)$

Rel. Max $(-.786, 8.209)$ Rel. Min $(2.12, -4.06)$

Abs. Max N/A Abs. Min N/A

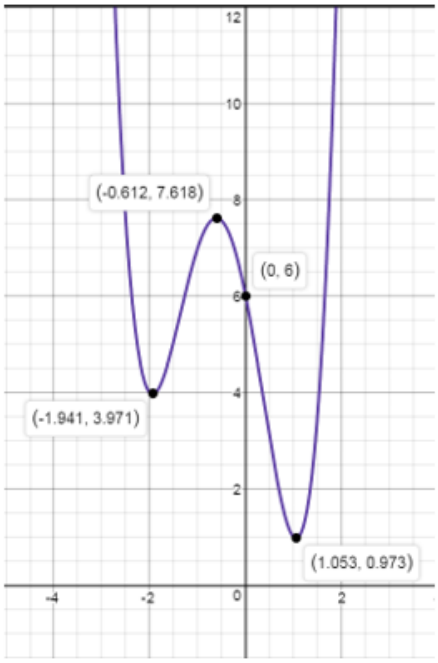
X intercept $(-2,0)(1,0)(3,0)$ y-intercept $(0,6)$

Zeros: $x = -2$, $x = 1$, $x = 3$ Even/Odd/Neither Neither

End Behavior as $x \to \infty$, $f(x) \to \infty$

as $x \to -\infty$, $f(x) \to -\infty$

2.



Domain $\mathbb{R}$ Range $(.973, \infty)$

Int. of Inc. $(-1.941, -.612) \cup (1.053, \infty)$ Int. of dec. $(-\infty, -1.941) \cup (-.612, 1.053)$

Rel. Max $(-.612, 7.618)$ Rel. Min $(-1.941, 3.971)$

Abs. Max None Abs. Min $(1.053, .973)$

X intercept None y-intercept $(0, 6)$

Zeros: None Even/Odd/Neither Neither

End Behavior as $x \to \infty$, $f(x) \to \infty$

as $x \to -\infty$, $f(x) \to \infty$