

**Objective: Analyzing key features of a graph.**

A function can be described in many ways! Functions can be described by their behavior, specific regions and by specific locations.

**Part I: Key Locations of a Function**

\*\*\*Locations are listed as **ordered pairs**\*\*\*

|  |  |
|--|--|
| <u>Relative Minimum(s):</u><br>The lowest point in a particular section of a graph.                                | <u>Relative Maximum(s):</u><br>The highest point in a particular section of a graph.                               |
| <u>Absolute Minimum:</u><br>The lowest point over the entire domain of a function or relation                      | <u>Absolute Maximum:</u><br>The highest point over the entire domain of a function or relation                     |
| <u>X-intercept(s):</u><br>The place where the function crosses the X-axis<br>• y-coordinate is <u>always</u> zero. | <u>Y-intercept(s):</u><br>The point where the function crosses the y-axis<br>• X-coordinate is <u>always</u> zero. |

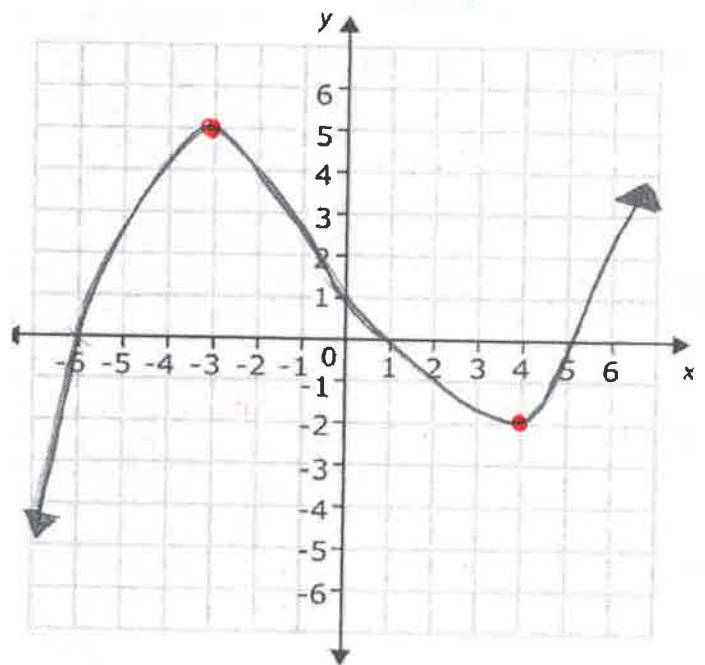
**Label & List the Key Locations of the Function Provided!**

Rel. min:  $(4, -2)$

Rel. max:  $(-3, 5)$

X-int:  $(-6, 0)$ ,  $(1, 0)$ , and  $(5, 0)$

y-int:  $(0, 1)$



## Part II: Key Regions of a Function

\*\*\*Regions are listed as inequalities or intervals\*\*\*

|  |  |
|--|--|
| <u>Increasing Interval(s):</u><br>A function is increasing when the y-value increases as the x-value increases | <u>Decreasing Interval(s):</u><br>The y-value decreases as the x-value increases |
| <u>Constant Interval(s):</u><br>A constant function forms a horizontal line.                                   | <u>Domain:</u><br>The set of all of the x-coordinates/inputs of a function.      |
| <u>Range:</u><br>The set of all of the y-coordinates/outputs of a function.                                    |  |

Label & List the Key Regions of the Function Provided!

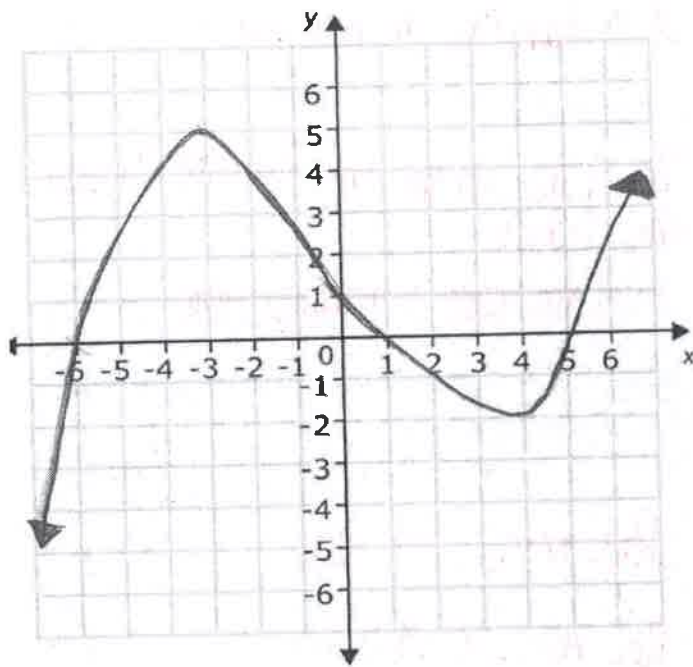
Increasing:  $x < -3$  or  $x > 4$   
 $(-\infty, -3) \cup (4, \infty)$

Decreasing:  $-3 < x < 4$   
 $(-3, 4)$

Constant: none

Domain:  $(-\infty, \infty)$   $\mathbb{R}$

Range:  $(-\infty, \infty)$   $\mathbb{R}$

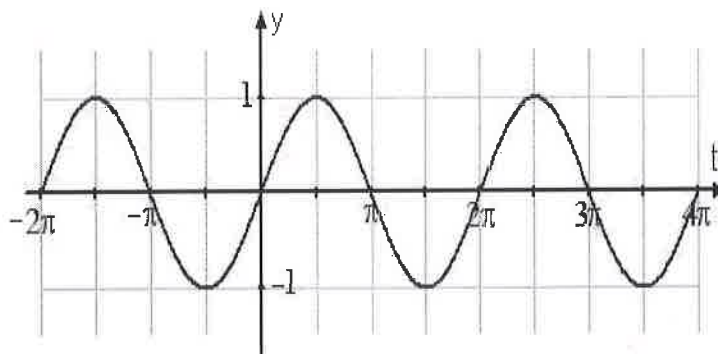
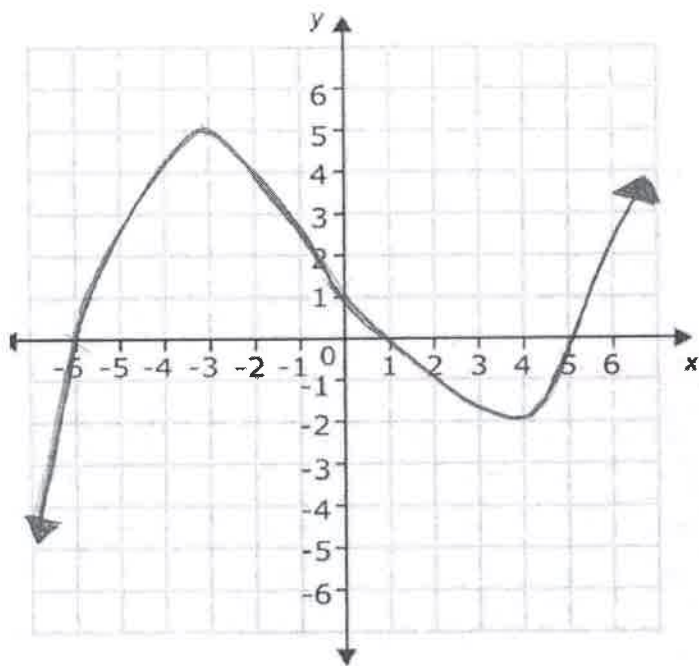


### Part III: Key Behaviors of a Function

\*\*\*Behaviors are listed with vocabulary & proper notation\*\*\*

|  |  |
|--|--|
| <u>End behavior:</u><br>The behavior of the graph $f(x)$ as $x$ approaches positive infinity or negative infinity. | <u>Symmetry:</u><br>The graph has equal parts if a line is drawn through its center. |
| <u>Periodicity:</u><br>A function that repeats its $y$ -values in regular intervals or periods                     |  |

Label & List the Key Behaviors of the Function Provided!



Periodic? Yes - the period is  $2\pi$

End Behavior:

$$x \rightarrow -\infty, f(x) \rightarrow -\infty$$

$$x \rightarrow \infty, f(x) \rightarrow \infty$$

Symmetric? No

Periodic? No

**Example 1:** Determine the key features of the following graphs. If it is not present write "not applicable".

A.)

x-intercept(s):  $(-3, 0), (1.5, 0)$

y-intercept(s):  $(0, 3)$

Domain:  $(-\infty, \infty)$

Range:  $(-3, \infty)$

Increasing Intervals:  $(-3, 0) \cup (3, \infty)$

Decreasing Intervals:  $(-\infty, -3) \cup (0, 3)$

Constant Intervals: *none*

Max/ Min (label relative or absolute):

*Rel. max:  $(0, 3)$*

*Rel. min:  $(-3, 0), (3, -3)$*

*Abs. min:  $(3, -3)$*

Symmetric (circle one)?    Yes    or     No

End behavior

$x \rightarrow +\infty, y \rightarrow \infty$

$x \rightarrow -\infty, y \rightarrow \infty$

Periodic (circle one)?    Yes    or     No

