

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Characteristics of Graphs

### Interval Notation:

Represents an interval as a pair of numbers. The numbers are the endpoints of the interval. ( ) and/or [ ] are used to show excluded or included.

Interval :  $7 \leq x < 19$        $-3 < y \leq 12$   
 $[7, 19)$        $(-3, 12]$

### Domain and Range:

**Domain:** The x-values that are contained in the graph. Write it from left to right.

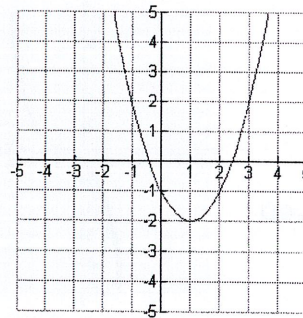
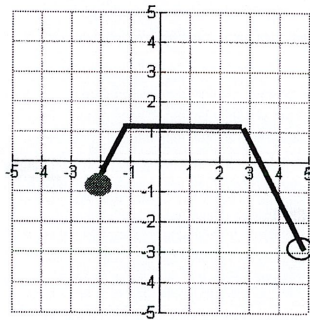
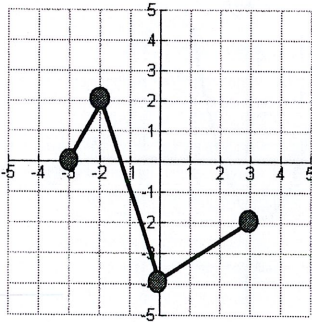
**Range:** The y-values that are contained in the graph. Write it from bottom to top.

Examples:

1) D:  $[-3, 3]$   
 R:  $[-4, 2]$

2) D:  $[-2, 5)$   
 R:  $(-3, 1]$

3) D:  $(-\infty, \infty)$   
 R:  $[-2, \infty)$



### Interval of Increasing and Decreasing:

Always read from left to right

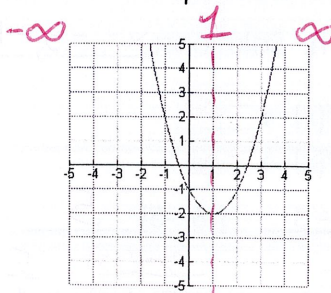
- If your finger is going up, the graph is increasing.
- If going down, the graph is decreasing.

**Example:**

Inc:  $(-1, \infty)$

Dec:  $(-\infty, 1)$

\*\*Only use Parentheses!\*\*



### Extrema:

**Maximum value:** the highest point seen in the data or on the graph.

**Minimum value:** the lowest point seen in the data or on the graph.

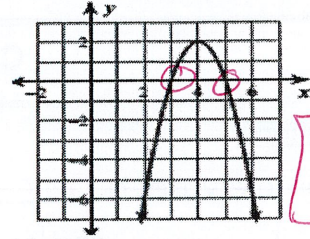
Extrema: Min(1, -2)

Axis of Symmetry: x = 1  
 $x = h$

**Zeros/Roots/Solutions**

These are all synonyms for x-intercept.

Written  $x = \underline{\hspace{2cm}}$



$x = 3, 5$

**Intercepts**

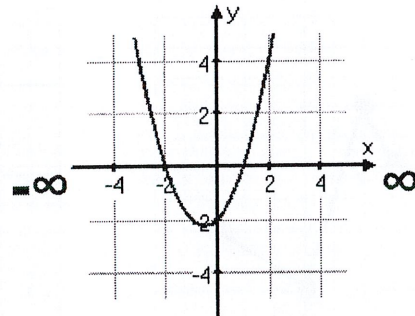
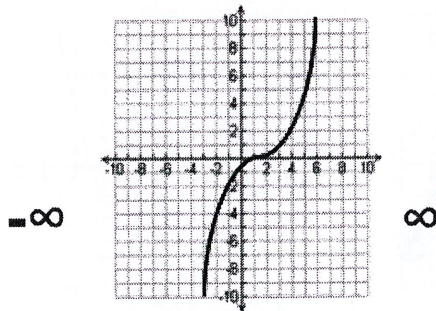
- **x-intercept** – the point at which the line intersects the x-axis.  $(x, 0)$
- **y-intercept** – the point at which the line intersects the y-axis.  $(0, y)$

**End Behavior:**

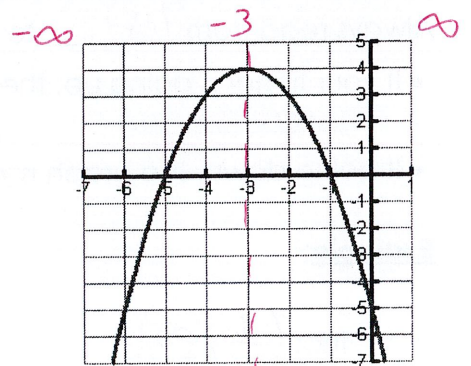
- What a function keeps doing after it leaves the graph
- $x \rightarrow \infty$  : As x goes to the right, where does y go?
- $x \rightarrow -\infty$  : As x goes to the left, where does y go?

1)  $x \rightarrow \infty \quad f(x) \rightarrow \infty$   
 $x \rightarrow -\infty \quad f(x) \rightarrow -\infty$

2)  $x \rightarrow \infty \quad f(x) \rightarrow \infty$   
 $x \rightarrow -\infty \quad f(x) \rightarrow \infty$



- a. Domain:  $(-\infty, \infty)$       b. Range:  $(-\infty, 4]$
- c. Extrema: Max(-3, 4)      d. Axis of Sym:  $x = -3$
- e. Increasing:  $(-\infty, -3)$       f. Decreasing:  $(-3, \infty)$
- g. Y-Intercept:  $(0, -5)$       h. Solutions:  $x = -5, -1$



i. End Behavior:  $x \rightarrow \infty \quad f(x) \rightarrow -\infty$   
 $x \rightarrow -\infty \quad f(x) \rightarrow -\infty$

\*\* j. Rate of Change  $[-3, 0] \underline{-3}$        $[-6, -5] \underline{5}$

$\frac{-5 - 4}{0 - (-3)} = \frac{-9}{3} = -3$        $\frac{0 - (-2)}{-5 - (-6)} = \frac{2}{1} = 2$