Foundations of Algebra Unit 6

**Day 7 – Characteristics of Linear Functions**

One key component to fully understanding linear functions is to be able to describe characteristics of the graph and its equation. **Important:** If a graph is a line (arrows), we need to assume that it goes on forever.

**Domain and Range**

|  |
| --- |
| **Domain** |
| **Define:**All possible values of x | **Think:**How far left to right does the graph go? | **Write:**[smallest #, largest #] |
| **Range** |
| **Define:** All possible values of y | **Think:**How far down to how far up does the graph go? | **Write:**[smallest #, largest #] |

**Non Linear Examples:**

1. 2. 3.



Domain: Domain: Domain:

Range: Range: Range:

**Linear Examples:**

1. 2.

 

Domain: Domain:

Range: Range:

**X and Y intercepts**

|  |
| --- |
| **Y-Intercept** |
| **Define:**Point where the graph crosses the y-axis | **Think:**At what coordinate point does the graph cross the y-axis? | **Write:**(0, b) |
| **X-Intercept** |
| **Define:** Point where the graph crosses the x-axis  | **Think:**At what coordinate point does the graph cross the x-axis? | **Write:**(a, 0) |
| **Zero** |
| **Define:**Where the function (y-value) equals 0 | **Think:**At what x-value does the graph cross the x-axis? | **Write:**x = \_\_\_\_ |

**Linear Examples:**

1. 2.

 

Y-intercept: Y-intercept:

X-intercept X-intercept:

Zero: Zero:

3. 4.

 

Y-intercept: Y-intercept:

X-intercept X-intercept:

Zero: Zero:

**Interval of Increase and Decrease**

|  |
| --- |
| **Interval of Increase** |
| **Define:**The part of the graph that is rising as you read left to right.  | **Think:**From left to right, is my graph going up? | **Write:**[x value where it starts increasing, x value where is stops increasing] |
| **Interval of Decrease** |
| **Define:** The part of the graph that is falling as you read from left to right.  | **Think:**From left to right, is my graph going down? | **Write:**[x value where it starts decreasing, x value where is stops decreasing] |
| **Interval of Constant** |
| **Define:** The part of the graph that is a horizontal line as you read from left to right.  | **Think:**From left to right, is my graph a flat line? | **Write:**[x value where it starts flat-lining, x value where is stops flat-lining] |



**Non Linear Example:**

Interval of Increase:

Interval of Decrease:

Interval of Constant:

**Linear Examples:**

1. 2.

Interval of Increase: Interval of Increase:

Interval of Decrease: Interval of Decrease:

Interval of Constant: Interval of Constant:

**Maximum and Minimum (Extrema)**

|  |
| --- |
| **Maximum** |
| **Define:**Highest point or peak of a function.  | **Think:**What is my highest point or value on my graph? | **Write:**y = biggest y-value |
| **Minimum** |
| **Define:** Lowest point or valley of a function.  | **Think:**What is the lowest point or value on my graph? | **Write:**y = smallest y-value |



**Non Linear Examples:**

1. 2. 3.



Maximum: Maximum: Maximum:

Minimum: Minimum: Minimum:

**Linear Examples:**

1. 2.

 

Maximum: Maximum:

Minimum: Minimum:

**Positive and Negative Regions on a Graph**

|  |
| --- |
| **Positive** |
| **Define:** The part of the function that is above the x-axis.  | **Think:**Which part of the function is in the positive region and where? | **Write:**[smallest x-value that is positive, largest x-value that is positive] |
| **Negative** |
| **Define:** The part of the function that is below the x-axis.  | **Think:**Which part of the function is in the negative region and where? | **Write:**[smallest x-value that is negative, largest x-value that is negative] |

1.



Positive: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Negative: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. 3.

Positive: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Positive: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Negative: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Negative: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**End Behavior**

|  |
| --- |
| **End Behavior** |
| **Define:** Behavior of the ends of the function (what happens to the y-values or f(x)) as x approaches positive or negative infinity. The arrows indicate the function goes on forever so we want to know where those ends go.  |
| **Think:**As x goes to the left (negative infinity), what direction does the left arrow go? | **Write:**As x 🡪 -$\infty $, f(x) 🡪 \_\_\_\_\_ |
| **Think:**As x goes to the right (positive infinity), what direction does the right arrow go? | **Write:**As x 🡪 $\infty $, f(x) 🡪 \_\_\_\_\_ |

1. 2.

 

As x 🡪 -$\infty $, f(x) 🡪 \_\_\_\_\_ As x 🡪 -$\infty $, f(x) 🡪 \_\_\_\_\_

As x 🡪 $\infty $, f(x) 🡪 \_\_\_\_\_ As x 🡪 $\infty $, f(x) 🡪 \_\_\_\_\_

3. 4.

As x 🡪 -$\infty $, f(x) 🡪 \_\_\_\_\_ As x 🡪 -$\infty $, f(x) 🡪 \_\_\_\_\_

As x 🡪 $\infty $, f(x) 🡪 \_\_\_\_\_ As x 🡪 $\infty $, f(x) 🡪 \_\_\_\_\_

**Practice**

|  |  |
| --- | --- |
| **Practice Example 1** | **Practice Example 2** |
| *Domain:**Range:* | *Domain:**Range:* |
| *Y-intercept:**X-intercept:**Zero:* | *Y-intercept:**X-intercept:**Zero:* |
| *Interval of Increase:**Interval of Decrease:**Interval of Constant:* | *Interval of Increase:**Interval of Decrease:**Interval of Constant:* |
| *Maximum:**Minimum:*  | *Maximum:**Minimum:*  |
| *Positive:* *Negative:* | *Positive:* *Negative:* |
| *End Behavior:*As x 🡪 -$\infty $, f(x) 🡪 \_\_\_\_\_As x 🡪 $\infty $, f(x) 🡪 \_\_\_\_\_ | *End Behavior:*As x 🡪 -$\infty $, f(x) 🡪 \_\_\_\_\_As x 🡪 $\infty $, f(x) 🡪 \_\_\_\_\_ |