Characteristics of Graphs

10/28/2013

Domain & Range

- **Domain** – all x-values of a function (width of the graph). To find the domain, **look left to right**.

To write: left point to right point

- **Range** – all y-values of a function (height of the graph). To find the range, **look down to up**.

To write: lowest point to highest point

*You will always write your answer for domain and range from least to greatest number.

Notation

*[,] if touches *(,) never touches

- **Interval Notation** – represents an interval as a pair of numbers. The numbers are the endpoints of the interval. Parentheses and/or brackets are used to show whether the endpoints are excluded or included.
- **Set Notation** – uses inequalities to describe the values.

D: (leftest point, rightest point)
R: (lowest point, highest point)

≤ touches < never touches

D: left point < x < right point
R: lowest point < y < highest point

Extrema

- **Maximum Point** – greatest value of the function (highest point on the graph)
- **Minimum Point** – least value of the function (lowest point on the graph)

If the min or the max is $+\infty$ or $-\infty$ there is NO min or max

If there is a min or max, write as a coordinate (x,y)

Intercepts

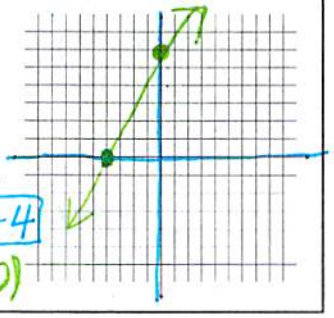
- **x-intercept** – the point at which the line crosses/intersects the x-axis at **(x, 0)**...always has a y-coordinate of 0

zeros

- **y-intercept** – the point at which the line crosses/intersects the y-axis at **(0, y)**...always has an x-coordinate of 0

Find the x and y intercepts, then graph.

-3x + 2y = 12

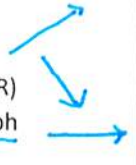


X-intercept:
Plug in 0 for y
$-3x + 2(0) = 12$
$\frac{-3x}{-3} = \frac{12}{3}$ $x = -4$
(-4, 0)

Y-intercept:
Plug in 0 for x
$-3(0) + 2y = 12$
$\frac{2y}{2} = \frac{12}{2}$ $y = 6$
(0, 6)

Increasing, Decreasing, or Constant

- Look from **left** to **right** and notice what happens to the y-values
- ***Increasing***, graph goes up (L to R)
- ***Decreasing***, graph falls down (L to R)
- ***Constant***, graph is a horizontal graph



*****ALWAYS USE X VALUES*****

*Write intervals of increase or decrease like you would write the domain *

$X \to \infty, f(x) \to \_\_$
$X \to -\infty, f(x) \to \_\_$

End Behavior

- **Figuring out what y-value the graph is approaching as x gets bigger and as x gets smaller.**
- **Look at the ends of the graph (the arrows) to determine end behavior.**

End Behavior

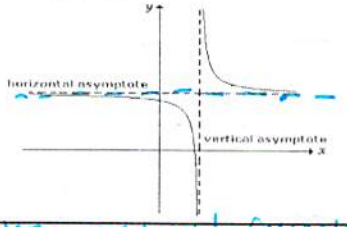
- If the graph is going **UP** (arrow points up), the y-value is approaching $+\infty$
- If the graph is going **DOWN** (arrow points down), the y-value is approaching $-\infty$

If exponential, 1 side will approach the asymptote

Asymptote

A line that a graph gets closer and closer to, but **never** crosses or touches.

*y=#



*only exponential functions have asymptotes

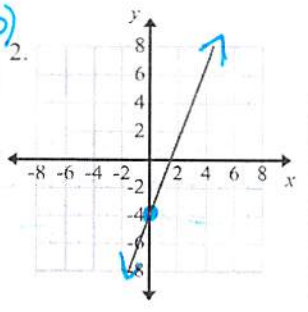
Continuous vs. Discrete

- ***Continuous Function*** has NO breaks (all points are connected)
- ***Discrete Function*** has gaps or breaks (all points are not connected)

Characteristics

1. Domain: $(-\infty, \infty)$
2. Range: $(-\infty, \infty)$
3. Intercepts:
4. Increasing or Decreasing?
5. Maximum or Minimum?

none

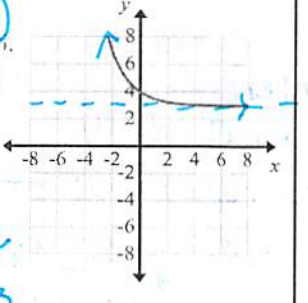


3. X: (1.5, 0)
Y: (0, -4)

4. Increasing $(-\infty, \infty)$

Characteristics

1. Domain: $(-\infty, \infty)$
2. Range: $(3, \infty)$
3. Intercepts:
4. Increasing or Decreasing?
5. Maximum or Minimum? none
6. Asymptote: $y = 3$



3. (0, 4)

4. Decreasing