

Chapter 3.2 Notes
Graph of a Function

1. Use the graph of the function f to answer parts a-n.

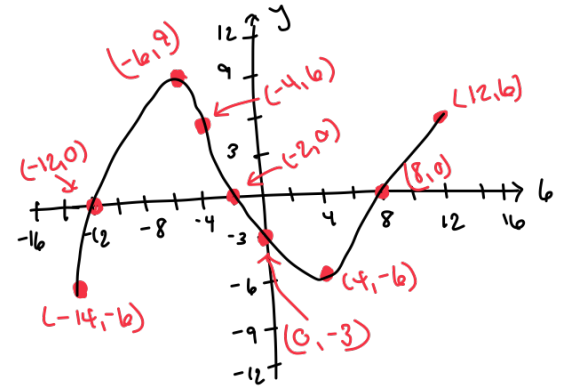
a.) Find $f(-14)$ and $f(-6)$

$$f(-14) = -6$$

• This means when x is -14 , what is y ?

$$f(-6) = 9$$

• When x (1st number in ordered pair is -6 , what is y (2nd number in ordered pair.)



b.) Find $f(12)$ and $f(0)$

$$f(12) = 6$$

$$f(0) = -3$$

c.) Is $f(4)$ positive or negative?

$$f(4) = -6$$

So, it is negative.

d.) Is $f(-6)$ positive or negative?

$$f(-6) = 9$$

So it is positive.

← Wants to know if the y is negative or positive.

- * To determine if it is positive or negative, find the ordered pair that has the number in parenthesis as the 1st number.
- * Then look at the 2nd number on the ordered pair, if it is a positive number then it is positive. If it is a negative number, then it is a negative.

e.) For what values of x is $f(x) = 0$?

$$x = -12, -2, 8$$

↑ This asks when $y = 0$, what is x ?

- * Here we are looking for ordered pairs where the y , or 2nd number, is 0. Basically, where the graph crosses the x axis.

f.) For what values of x is $f(x) > 0$?

$$-12 < x < -2, \quad 8 < x \leq 12$$

* Here we are look for when x is above 0 (the x -axis).

- * looking at the graph, you are look for when the graph is above the x -axis.
- * It will be written in a compound inequality.
- * Start with the left side of the graph, trace it with your finger. When it crosses over the x -axis, write down that number.
- * Then keep tracing the graph until it starts to cross over the graph and go below it. That will be the 2nd number.
- * Place an x in between the numbers with the inequality sign on each side.
- * Continue to follow the graph, writing down numbers like instructed.

g.) What is the domain of f?

$$-14 \leq x \leq 12$$

1st number on x-axis
on left side
where graph starts

last number on
x-axis on right
side where graph
ends.

- * To find the domain, start on the left side of the graph.
- * Place your finger where the graph starts and see what number goes with that point on the x-axis. Write down that number.
- * Trace the graph all the way to the right. Put your finger on where it stops and see where that corresponds on the x axis. This will be your 2nd number.
- * Be sure and place an x between them with and inequality sign on each side of the x.

h.) What is the range of f?

$$-6 \leq y \leq 9$$

lowest number
on the y-axis
that corresponds
to a point on graph

highest number
on y-axis that
corresponds to a
point on graph

- * To find the range, start at the bottom of the graph.
- * Place your finger where the graph starts and see what number goes with that point on the y-axis. Write down that number.
- * Then go to the top of the graph. Put your finger on the highest point and see where that corresponds on the y axis. This will be your 2nd number.
- * Be sure and place a y between them with and inequality sign on each side of the y.

i.) What are the x-intercepts?

$$-12, -2, 8$$

- * look at the x-axis. Write down the number(s) where the graph crosses the x-axis.

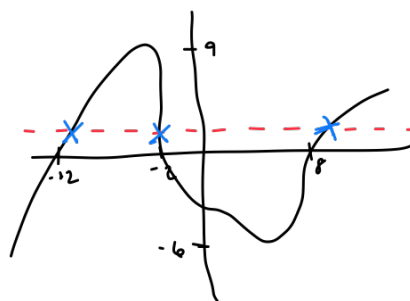
j.) What are the y-intercepts?

$$-3$$

- * look at the y-axis. Write down the number(s) where the graph crosses the y-axis.

k.) How often does the line $y=1$ intersect the graph?

3



- * If you graphed the line $y=1$, it would be a horizontal line (going left and right) across the 1 on the y axis.
- * Think, how many times would that line touch (or go through) the graph.

$y=1$ crosses the graph 3 times

L.) How often does the line $x=3$ intersect the graph?

1



- * If you graphed the line $x=3$, it would be a vertical line (going up and down) across the 3 on the x axis.
- * Think, how many times would that line touch (or go through) the graph.

$x=3$ crosses graph 1 time

m.) For what values of x does $f(x) = -6$

-14, 4

* looking for what x equals, when $y = -6$

- * This asks when $y = -6$, what are the values of x .
- * So, find the -6 on the y axis, then go left and right and find at what points are on this line.
- * Write down the x value of each point.

n.) For what values of x does $f(x) = 9$

-6

* looking for what x equals, when $y = 9$

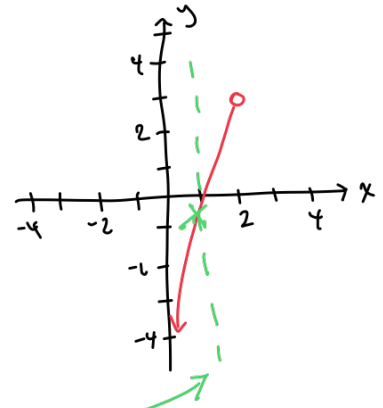
- * This asks when $y = 9$, what are the values of x .
- * So, find the 9 on the y axis, then go left and right and find at what points are on this line.
- * Write down the x value of each point.

* Tip: $f(x) = y$ so $f(x) = 3$ means $y = 3$

2. Determine whether the graph on the right is that of a function by using the vertical line test. If it is, use the graph to answer the questions.

* It is a function, because every vertical line intersects the graph in at most one point.

* For vertical line test, draw vertical lines (ones going up + down) through graph. If it only crosses the graph once, then it's a function.

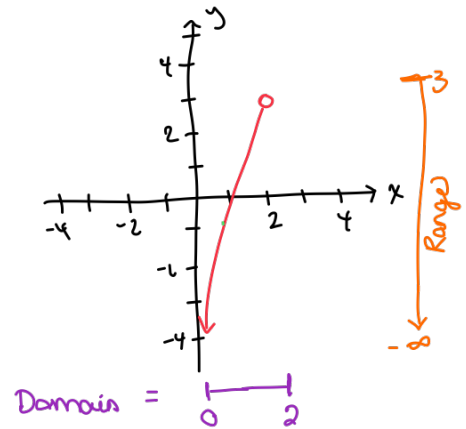


a.) What are the domain & range of the function?

Domain = $0 < x < 2$ $(0, 2)$

Range = $y < 3$ $(-\infty, 3)$

* Since there is an open circle at the top of range, + end of domain, we use () around the number.



b.) What are the intercepts:

$(1, 0)$

* Looking for points where graph crosses the x or y axis.

c.) Determine the Symmetry:

No symmetry

To Determine Symmetry:

x-axis : fold on x-axis + see if sides mirror each other.

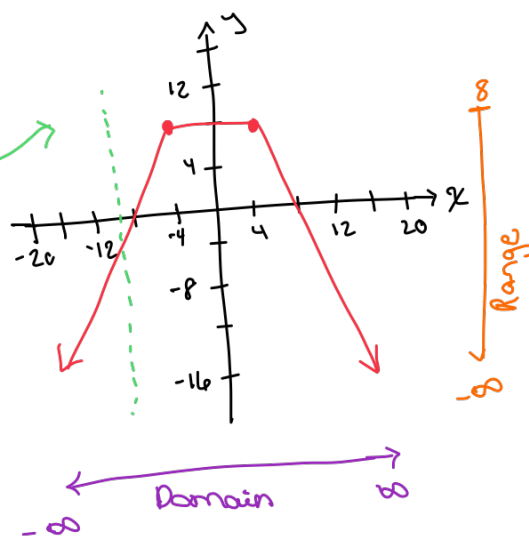
y-axis : fold on y-axis + see if sides mirror each other.

origin : flip paper upside down, + see if it looks exactly the same.

3. Determine whether the graph is that of a function by using the vertical line test. If it is then answer the following questions.

- The graph is a function.

* for vertical line test, draw vertical lines, (ones going up + down) through graph. If it only crosses the graph once, then it's a function.



a.) what are the domain + range?

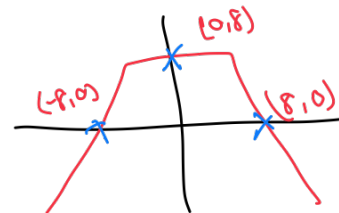
$$\text{Domain} = (-\infty, \infty)$$

$$\text{Range} = (-\infty, 8]$$

b.) What are the intercepts?

$$(-8, 0), (0, 8), (8, 0)$$

* intercepts are where it crosses the x or y axis



c.) Determine if the graph is symmetrical.

Symmetric to y-axis

To Determine Symmetry:

x-axis : fold on x-axis + see if sides mirror each other.

y-axis : fold on y-axis + see if sides mirror each other.

origin : flip paper upside down, + see if it looks exactly the same.

4. Answer the questions about the following function.

$$f(x) = 2x^2 - x - 1$$

a. Is the point $(-2, 9)$ on the graph of f ?

$$y = 2x^2 - x - 1 \quad (-2, 9)$$

$x \quad y$

$$9 = 2(-2)^2 - (-2) - 1$$

$$9 = 9$$

Yes, because substituting $x = -2$ into the given equation results in 9.

b. If $x = 2$, what is $f(x)$? What point is on the graph of f ?

$$f(x) = 2x^2 - x - 1 \quad x = 2$$

$$f(x) = 2(2)^2 - (2) - 1$$

$$f(x) = 5$$

$$(2, 5)$$

* Replace each x with your number.

• Then type into calculator to find $f(x)$ or y .

c. If $f(x) = -1$, what is x ? What points are on the graph of f ?

$$f(x) = 2x^2 - x - 1 \quad f(x) = -1$$

$$-1 = 2x^2 - x - 1$$

+1

+1

$$0 = 2x^2 - x + 0$$

$a=2 \quad b=-1 \quad c=0$

$$x = \frac{1}{2}, 0$$

$$\left(\frac{1}{2}, -1\right), (0, -1)$$

* Replace $f(x)$ with your number.

• Then get number to right side.

• Now use quadratic formula to solve for x .

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2(a)}$$

$$\frac{-(-1) \pm \sqrt{(-1)^2 - 4(2)(0)}}{2(2)}$$

quadratic formula

d. What is the domain of f ? $f(x) = 2x^2 - x - 1$

$$(-\infty, \infty)$$

* Since there is no fraction or square root, the domain is any real number, written as $(-\infty, \infty)$.

e. List the x-intercepts, if any, of the graph.

$$y = 2x^2 - x - 1$$

Replace y with "0"

$$y = 2x^2 - x - 1$$

$$0 = 2x^2 - x - 1$$

$$\begin{array}{ccc} \uparrow & \uparrow & \uparrow \\ a=2 & b=-1 & c=-1 \end{array}$$

Quadratic formula

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-(-1) \pm \sqrt{(-1)^2 - 4(2)(-1)}}{2(2)}$$

$$x = 1, -\frac{1}{2}$$

* Replace $f(x)$, or y , with 0 and then solve for x .

* Use the quadratic formula.

f. List the y intercept, if there is one of the graph of f .

$$y = 2x^2 - x - 1$$

$$y = 2x^2 - x - 1$$

Replace each x with "0".

* Replace the x 's with 0 and then solve for y .

$$y = 2(0)^2 - 0 - 1$$

Type into calculator

$$y = -1$$

5. Answer the questions about the following function.

$$f(x) = \frac{x+8}{x-10}$$

a. Is the point $(3, -13/5)$ on the graph of f ?

$$y = \frac{x+8}{x-10} \quad \left(\underset{x}{3}, \underset{y}{-\frac{13}{5}} \right)$$

$$-\frac{13}{5} = \frac{3+8}{3-10}$$

$$-\frac{13}{5} \neq -\frac{11}{7}$$

No, because substituting $x=3$ into the given equation does not result in $-\frac{13}{5}$.

- * Replaces x 's with 1st number in ordered pair.
- * Replaces y or $f(x)$ with 2nd number in ordered pair
- * Simplify each side + see if they equal each other.

b. If $x = 4$, what is $f(x)$? What point is on the graph of f ?

$$f(x) = \frac{x+8}{x-10} \quad x = 4$$

$$f(x) = \frac{4+8}{4-10} \quad \leftarrow \text{Type into calculator}$$

$$f(x) = -2 \quad (4, -2)$$

- * Replace each x with the number given.

c. If $f(x) = 2$, what is x ? What points are on the graph of f ?

$$f(x) = \frac{x+8}{x-10} \quad f(x) = 2$$

$$\cancel{2} = \frac{x+8}{x-10}$$

$$2(x-10) = x+8$$

$$2x - 20 = x + 8$$

$$\begin{array}{r} 2x - 20 = x + 8 \\ -x \quad -x \\ \hline x - 20 = 8 \\ +20 \quad +20 \\ \hline x = 28 \end{array}$$

$$28, 2$$

- * Replace the y or $f(x)$ with the number given.
- * Then cross multiply.
- * Now solve for x .

d. What is the domain of f?

$$\begin{array}{r} x-10 \neq 0 \\ \hline x \neq 10 \end{array}$$

$(-\infty, 10) \cup (10, \infty)$

- * write down the denominator and set it " $\neq 0$ ".
- * Then solve for x.

← This is interval notation.

e. List the x-intercepts, if any, of the graph.

Replace y with "0"

$$y = \frac{x+8}{x-10}$$

$$0 = \frac{x+8}{x-10}$$

$$0 = x+8$$

$$\begin{array}{r} -8 \\ \hline -8 = x \end{array}$$

- * Replace y with 0 and solve for x.

f. List the y intercept, if there is one of the graph of f.

$$y = \frac{x+8}{x-10}$$

Replace x with "0"

$$y = \frac{0+8}{0-10}$$

← Type into calculator

$$y = -\frac{4}{5}$$

- * Replace x with 0 and solve for y.