Chapter 6.2 Notes
One-to-one Functions & Inverse Functions

* one-to-one function: a function is not one-to-one if 2 different inputs correspond to the same output.

* In other words, if an you cannot have a repeat in the y's.

1. For the following function, determine whether the function is one-to-one.

$$\{(4,\underset{\underset{y}{\uparrow}}{9}),\ (3,\underset{\underset{y}{\uparrow}}{6}),\ (-7,\underset{\underset{y}{\uparrow}}{11}),\ (1,\underset{\underset{y}{\uparrow}}{-5})\}$$

· Since there are no repeat numbers in the y's, then it is a one-to-one function.

$\boxed{\text{Yes}}$

2. For the following function, determine whether the function is one-to-one.

$$\{(9,\underset{\underset{y}{\uparrow}}{9}),\ (10,\underset{\underset{y}{\uparrow}}{10}),\ (11,\underset{\underset{y}{\uparrow}}{48}),\ (12,\underset{\underset{y}{\uparrow}}{63})\}$$

· Since there are no repeat numbers in the y's, then it is a one-to-one function.

$\boxed{\text{Yes}}$

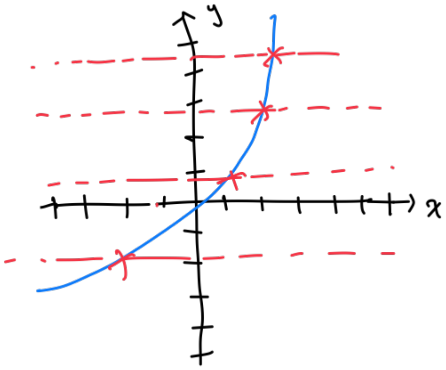
* Horizontal line test: If every horizontal line intersects the graph of a function f in at most one point, then f is one-to-one.

3. The graph of a function f is given. Use the horizontal-line test to determine whether f is one to one.

· Draw horizontal lines across the graph.

· If each line doesn't cross the graph more than 1 times, then it's a one-to-one.

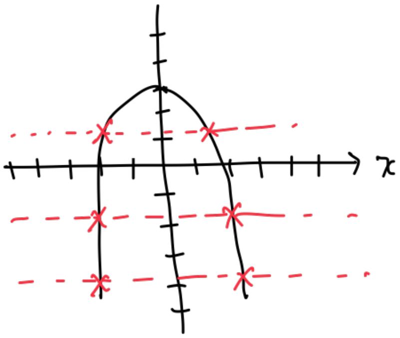
$\boxed{\text{Yes}}$



4. The graph of a function f is given. Use the horizontal-line test to determine whether f is one to one.

- Draw horizontal lines across the graph.
- If each line doesn't cross the graph more than 1 times, then it's a one-to-one.

$\boxed{\text{No}}$



* Inverse function: you switch the x an y's

ex.) $(2, 3)$ $\longleftrightarrow$ $(3, 2)$

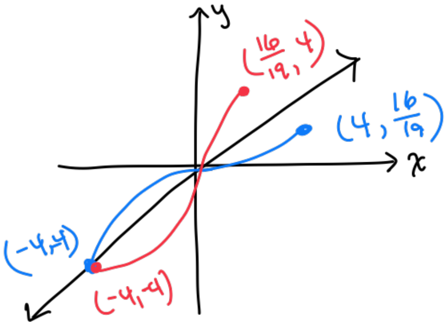
$\overset{\uparrow}{x}$ $\overset{\uparrow}{y}$ flip x y

5. The graph of a one-to-one function is shown to the right. Draw the graph of the inverse function f^{-1}

- Take each point + flip the x + y and the plot those points

$\left(4, \frac{16}{19}\right) \rightarrow \left(\frac{16}{19}, 4\right)$

$(-4, -4) \rightarrow (-4, -4)$



6. The graph of a one-to-one function is shown to the right. Draw the graph of the inverse function f

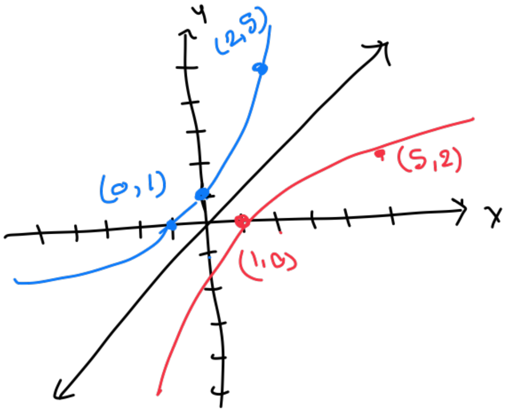
- Find 2 points on the graph

-Then-

- Take each point + flip the x + y and the plot those points

$(2,5) \rightarrow (5,2)$

$(0,1) \rightarrow (1,0)$



7. Find the inverse of the linear function f(x) = mx + b, where m ≠ 0.

$$f(x) = mx + b$$

$$y = mx + b$$

just switch the x + y

$$x = my + b$$

$$-b \qquad -b$$

now solve for "y"

$$x - b = my$$

$$\frac{x-b}{m} = \frac{my}{m}$$

$$\frac{x-b}{m} = y$$

* Replace f(x) with y.

* now switch the x and y in the equation.

* Then solve for y.
  - * Move the b to the other side by doing the opposite.
  - * Then divide both sides by the number in front of y.

8. Are the functions inverses of each other?

$$f(x) = 5x + 25, \quad g(x) = \frac{1}{5}x - 5$$

take 1st equation & switch x+y.

$$y = 5x + 25$$

$$x = 5y + 25$$

$$-25 \qquad -25$$

Then solve for "y".

$$x - 25 = 5y$$

$$\frac{x}{5} - \frac{25}{5} = \frac{5y}{5}$$

$$\frac{1}{5}x - 5 = y$$

They are the same so...

$$\boxed{\text{yes}}$$

* Look to see if this new equation is the same as the 2nd equation

* Write down the first equation and replace f(x) with y.

* now switch the x and y in the equation.

* Then solve for y.
  - * Move the number on the right to the left by doing the opposite.
  - * Then divide both sides by the number in front of y.

* Now since that equation looks just like the g(x) equation, then thy are inverse of each other.

9. Are the functions inverses of each other?

$$f(x) = (x-5)^2, \; x \ge 5; \quad g(x) = \sqrt{x+5}$$

$$y = (x-5)^2$$

Switch the x+y

$$x = (y-5)^2$$

Now solve for "y"

$$\sqrt{x} = \sqrt{(y-5)^2}$$

$$\sqrt{x} = y-5$$

$$+5 \qquad +5$$

$$\sqrt{x} + 5 = y$$

Not the same, so . . .

$$\boxed{\text{No}}$$

* Look to see if this new equation is the same as the 2nd equation

* Write down the first equation and replace f(x) with y.

* now switch the x and y in the equation.

* Then solve for y.

* Now since that equation does not look just like the g(x) equation, then thy are not inverse of each other.

10. Are the functions inverse of each other?

$$f(x) = x^3 - 4; \quad g(x) = \sqrt[3]{x+4}$$

$$y = x^3 - 4$$

Switch the x+y

$$x = y^3 - 4$$

$$+4 \qquad +4$$

Now solve for "y"

$$x+4 = y^3$$

$$\sqrt[3]{x+4} = \sqrt{y^3}$$

$$\sqrt[3]{x+4} = y$$

They are the same so...

$$\boxed{\text{yes}}$$

* Look to see if this new equation is the same as the 2nd equation

* Write down the first equation and replace f(x) with y.

* now switch the x and y in the equation.

* Then solve for y.

* Now since that equation looks just like the g(x) equation, then thy are inverse of each other.