UNIT 2 REVIEW

PRECALCULUS A

LESSONS:
- DOMAIN & RANGE OF A FUNCTION
- ALGEBRA OF FUNCTIONS
- COMPOSITION OF FUNCTIONS
- INVERSE FUNCTIONS
- VERIFYING INVERSE FUNCTIONS
- GRAPHS OF INVERSE FUNCTIONS

OUR CLASS WEBSITE: nca-patterson.weebly.com

BOOK A CALL TIME: jpattersonmath.youcanbook.me

Domain is the allowed values for x in a function.

Domain Restrictions:

1) Denominators cannot be equal to zero.
2) The radicand of a square root must be >= to zero.
   *Note: If there is a square root in a denominator then it can't be zero, so check for > zero.

Range is the allowed values for y in a function.

Range Restrictions:

1) Graph with Desmos.
2: Look for asymptote lines.

Interval Notation

* Looks at the end points of the domain and range.

1) Use parentheses ( ) for open interval end points.
2) Use brackets [ ] for closed interval end points
3) Infinity is always an open interval ☺

Set Builder Notation

* Uses inequalities to identify the end points.

1) Domain: {x| ______ }
   Read as "the set of all x such that x is ______ "
2) Range: {y| ______ }
   Read as "the set of all y such that y is ______ "

Algebra of Functions: You can …

ADD Functions … just combine like terms

SUBTRACT Functions … but watch the sign changes!

MULTIPLY Functions … just remember to distribute all terms

DIVIDE Functions … but watch for what would make the denominator zero

3. Find the domain of the function $(f \cdot g)(x)$ where $f(x)=\sqrt{x-2}$ and $g(x)=\sqrt{5-x}$.

$[2,\infty)$

$(-\infty,\infty)$

$(-\infty,2]\cup[5,\infty)$

$[2,5]$

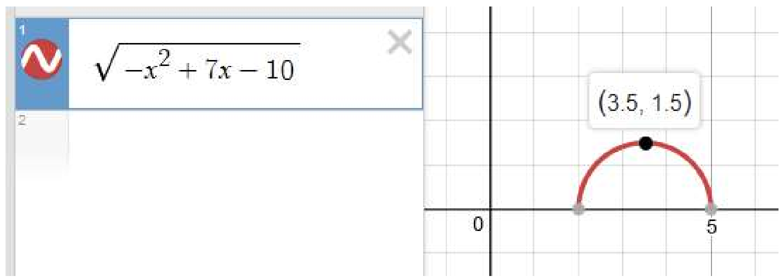
3. Find the domain of the function $(f \cdot g)(x)$ where $f(x)=\sqrt{x-2}$ and $g(x)=\sqrt{5-x}$.

$[2,\infty)$

$(-\infty,\infty)$

$(-\infty,2]\cup[5,\infty)$

➡ $[2,5]$



6. Let $f(x)=\dfrac{1}{x+2}$ and $g(x)=\dfrac{1}{x-3}$. Find $\left(\dfrac{f}{g}\right)(x)$. Assume all appropriate restrictions to the domain.

$\left(\dfrac{f}{g}\right)(x)=\dfrac{x+2}{x-3}$

$\left(\dfrac{f}{g}\right)(x)=\dfrac{x-3}{x+2}$

$\left(\dfrac{f}{g}\right)(x)=\dfrac{1}{x^2-x+6}$

$\left(\dfrac{f}{g}\right)(x)=x^2-x+6$

Composition of Functions:

(f o g)(x) means to plug in what the g(x) function is equal to into the spots for x in the f(x) function.
It can also be written as f(g(x)).
It is read "f of g of x".

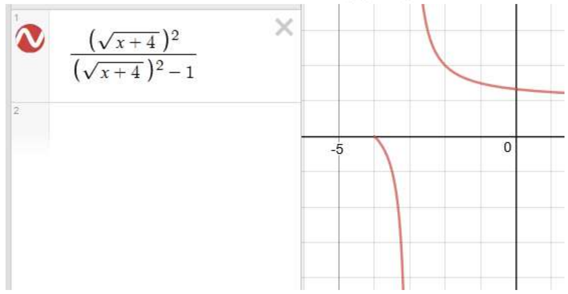
(g o f)(x) means to plug in what the f(x) function is equal to into the spots for x in the g(x) function.
It can also be written as g(f(x)).
It is read as "g of f of x".

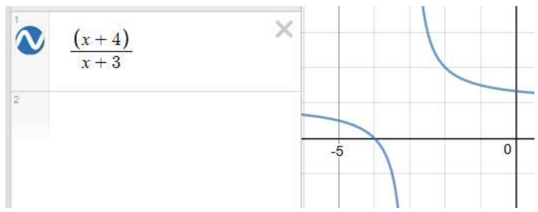
3. Determine the domain of the function $(f \circ g)(x)$ where $f(x)=\dfrac{x^2}{x^2-1}$ and $g(x)=\sqrt{x+4}$.

$(-\infty,-1)\cup(-1,1)\cup(1,\infty)$
$(-4,-3)\cup(-3,\infty)$
$(-\infty,-3)\cup(-3,\infty)$
$[-4,-3)\cup(-3,\infty)$

3. Determine the domain of the function $(f \circ g)(x)$ where $f(x)=\dfrac{x^2}{x^2-1}$ and $g(x)=\sqrt{x+4}$.

$(-\infty,-1)\cup(-1,1)\cup(1,\infty)$
$(-4,-3)\cup(-3,\infty)$
$(-\infty,-3)\cup(-3,\infty)$
→ $[-4,-3)\cup(-3,\infty)$





Inverses of Functions:

Basically, the x's and y's switch places!

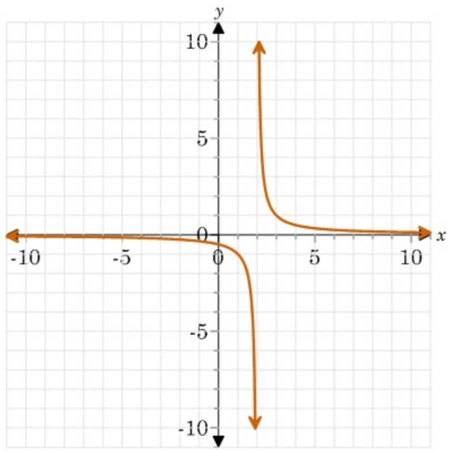
If the starting function is a one-to-one function,
then it's inverse will also qualify as a function.

A one-to-one function means every x value yields only one y,
AND, each y value came from only one x.

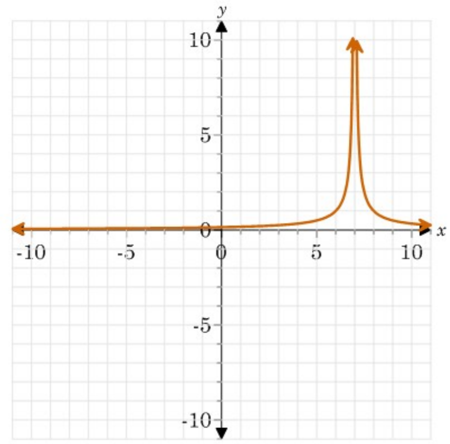
Test for a one-to-one function using the Horizontal Line Test,
after using the Vertical Line Test to test that it is a function.

One-To-One?

Yes



No



4. Determine the domain and range for the inverse of $f(x)=\frac{1}{x}+5$.

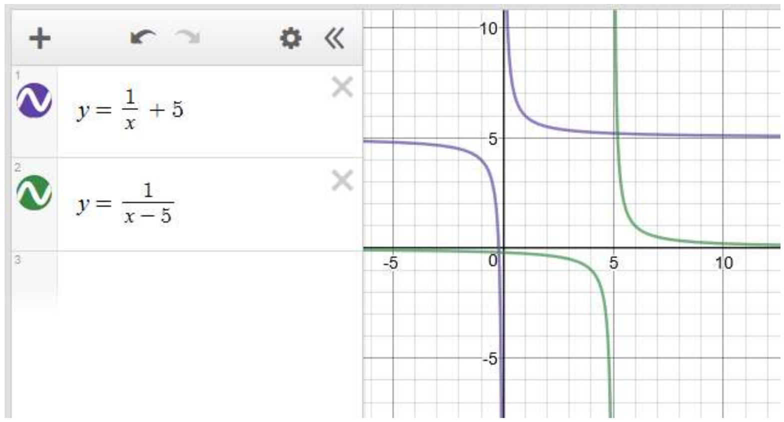
4. Determine the domain and range for the inverse of $f(x) = \dfrac{1}{x} + 5$.

Original Function:
Domain breaks at x=0
Range breaks at y=5

Inverse Function:
Domain breaks at x=5
Range breaks at y=0
… for Interval Notation:

✔ *(1 pts)* domain: $(-\infty,5)\cup(5,\infty)$

range: $(-\infty,0)\cup(0,\infty)$



Verifying Inverse Functions:

Inverses "reverse" each other.

So, in doing a composite, you should get that
(f o g)(x) = (g o f)(x)

If they are not equal, then the functions are not inverses.

1. Determine if the two functions *f* and *g* are inverses of each other algebraically. If not, why?

$$f(x)=\frac{2x+3}{4x-3};\ g(x)=\frac{3x+3}{4x-2}$$

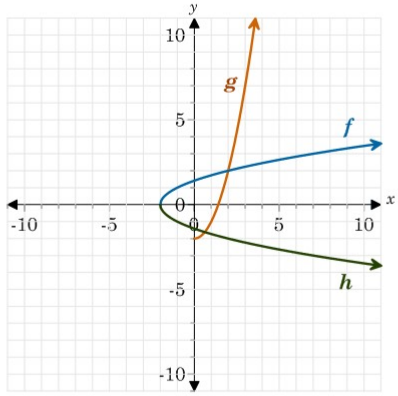
Verifying Inverse Functions:

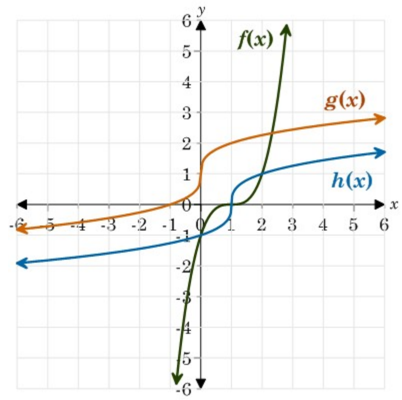
. . . So, yes, the composition of inverse functions
will always be equal to x!!

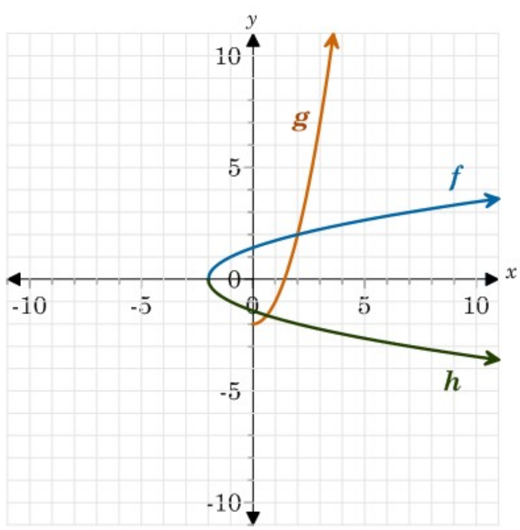
Think about it.
If you plug x into a function,
then take the result and reverse it with the inverse function,
you should end up back where you started!

Graphing Inverse Functions:

The graphs of inverse functions will be symmetrical about the diagonal line y=x.

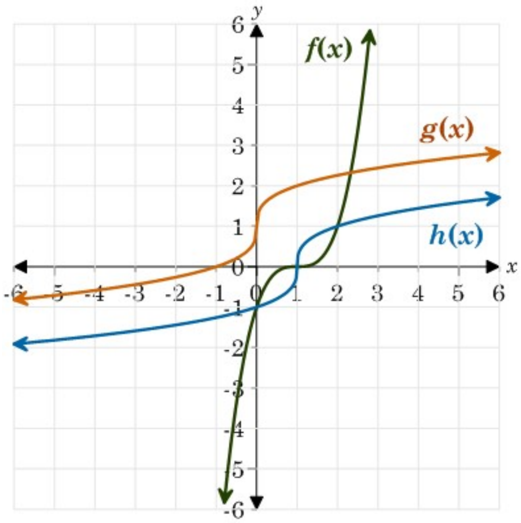






The inverses are g and f.

… f and h are reflections



The inverses are g(x) and f(x).

… g(x) and h(x) are translations

Questions??

Review the Key Terms and Key Concepts documents for this unit.

Look up the topic at khanacademy.org and virtualnerd.com

Check our class website at nca-patterson.weebly.com

*Reserve a time for a call with me at
jpattersonmath.youcanbook.me
We can use the LiveLesson whiteboard
to go over problems together.