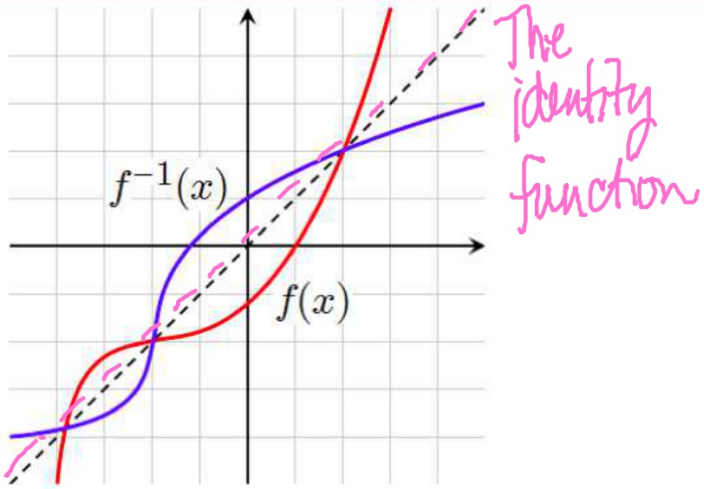
The Inverse Reflection Principle:

use to graphically "confirm" that functions are inverses

The points (a,b) and (b,a) in the coordinate plane are symmetric with respect to the line $\boxed{y=x}$. The points (a,b) and (b,a) are reflections of each other across the line y=x.



The Inverse Composition Rule:

Use to algebraically prove that functions are inverses of each other.

A function f is one-to-one with inverse function g if and only if

$f(g(x)) = x$ for every x in the domain of g, and

$g(f(x)) = x$ for every x in the domain of f.

composition

Example Verifying Inverse Functions

Show algebraically the $f(x) = x^3 + 2$ and $g(x) = \sqrt[3]{x - 2}$ are inverse functions.

$f(g(x))$

$f(\sqrt[3]{x-2})$

$(\cancel{\sqrt[3]{}}\,x-2)^{\cancel{3}} + 2$

$x - 2 + 2$

x ✓

$g(f(x))$

$g(x^3+2)$

$\sqrt[3]{x^3 + \cancel{2 - 2}}$

$\cancel{\sqrt[3]{}}\,x^{\cancel{3}}$

x ✓

Since $f(g(x)) = x$ and $g(f(x)) = x$, f and g are inverses.

AM: Find inverses of relations

2. Find the inverse of the relation $y = 2x + 4$.

[A] $y = \frac{2x-4}{2}$ [B] $y = \frac{x+4}{2}$ [C] $y = 4x+2$ [D] $y = \frac{x-4}{2}$

1. one-to-one ✓
2. Switch x & y

$x = 2y + 4$

3. Solve for y

$-4 \quad -4$

$\frac{x-4}{2} = \frac{2y}{2}$

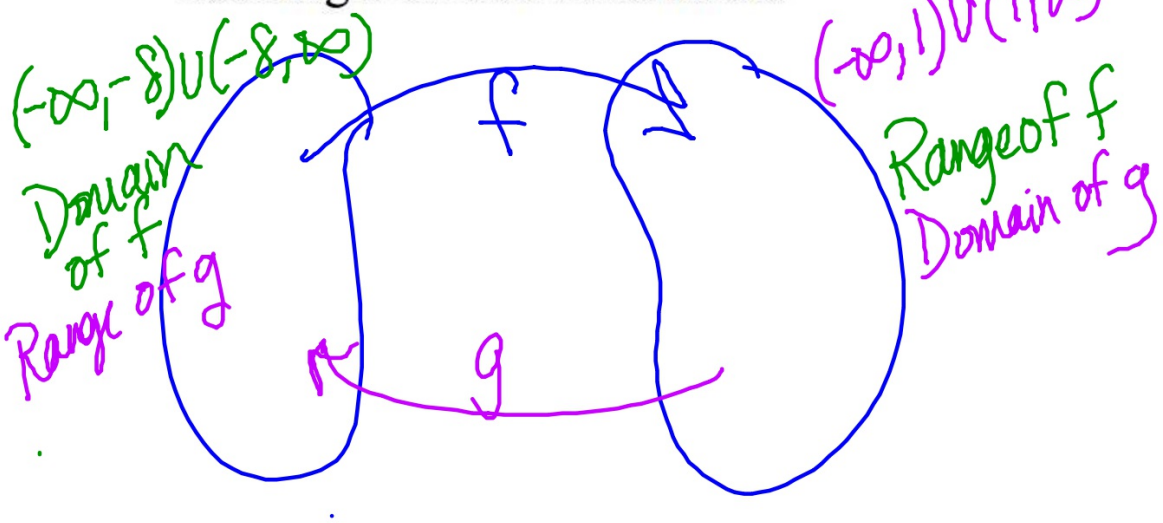
$\frac{x-4}{2} = y$

$2x-3=0$
$+3 \quad +3$
$2x=3$
$\cancel{2x=3}$
$x=3/2$

Quiz #3 Practice

- Let $f(x)=\dfrac{x-7}{x+8}$ and $g(x)=\dfrac{-8x-7}{x-1}$, the functions *f(t)* and *g(t)* are inverses.

  a) Draw a function map that reveals the relationships between *f(t)* and *g(t)* and their respective domains and ranges in interval notation.



Quiz Practice #3

b. Confirm algebraically that f and g are inverses by showing that $\boxed{f(g(x)) = x}$ and $g(f(x)) = x$.

$$f(x) = \frac{x-7}{x+8} \qquad g(x) = \frac{-8x-7}{x-1}$$

- Left side f(g(x))

$$f\left(\frac{-8x-7}{x-1}\right) = \frac{\left(\boxed{\frac{-8x-7}{x-1}} - 7\right)\boxed{\frac{(x-1)}{1}}}{\left(\boxed{\frac{-8x-7}{x-1}} + 8\right)\boxed{\frac{(x-1)}{1}}}$$

$$\frac{\frac{-8x-7}{\cancel{x-1}}\cancel{(x-1)} - 7(x-1)}{\frac{-8x-7}{\cancel{x-1}}\cancel{(x-1)} + 8(x-1)} = \frac{-8x\cancel{-7}-7x\cancel{+7}}{\cancel{-8x}-7\cancel{+8x}-8}$$

$$= \frac{\cancel{-15}x}{\cancel{-15}} = \boxed{x}$$

$g(f(x))$ $\quad g(x) = \frac{-8x-7}{x-1}$

- Right side ~~f(g(x))~~

$$g\left(\frac{x-7}{x+8}\right) = \frac{\left(-8\boxed{\frac{x-7}{x+8}} - 7\right)\frac{x+8}{1}}{\left(\boxed{\frac{x-7}{x+8}} - 1\right)\frac{x+8}{1}} = \frac{-8\left(\frac{x-7}{\cancel{x+8}}\right)\frac{\cancel{(x+8)}}{1} - 7\frac{(x+8)}{1}}{\frac{x-7}{\cancel{x+8}}\frac{\cancel{(x+8)}}{1} - 1\frac{(x+8)}{1}}$$

$$\frac{-8x+\cancel{56}-7x-\cancel{56}}{\cancel{x}-7-\cancel{x}-8} = \frac{-15x}{-15} = \boxed{x}$$

Since $f(g(x))$ = x and $g(f(x))$ = x, we have proven f(x) and g(x) are inverses.

1st 6 weeks (Alba) – Practice Test. 30%

2nd 6 Weeks – 15 objectives, 5 LCD, Unit Test. 30%

3rd 6 Weeks – 19 objectives, Unit Test Thurs 30%

Final 5 CR. 20 MC. 10%
+10%