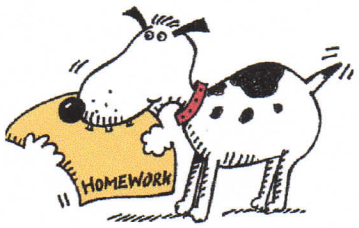
FORMATIVE ASSESSMENT

HOMEWORK TAKE-UP

229 #1, 3, 5, 6, 10, 11

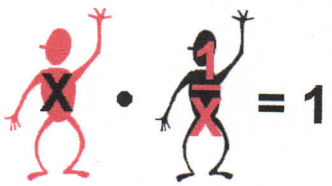


UNIT #4: Inverses and Transformations of Functions

Inverses

Learning Goal:

I will learn how to graph and interpret inverses of functions.



Lesson: Inverses of Functions

A function $f(x)$ and its inverse function $f^{-1}(x)$ undo each other.

The inverse of a function can be found by **interchanging the domain and range** of the function.

Example:
Find the inverse of $g = \{(4, -2), (2, 1), (1, 3), (-3, -3)\}$.

$g^{-1}(x) = \{(-2,4), (1,2), (3,1), (-3,-3)\}$

The inverse of a function can be found by **interchanging the *x* and *y*** in the equation of the function

Finding the inverse of functions:

Step 1: Replace *f(x)* with *y*

Step 2: Interchange *x* and *y*

Step 3: Solve for *y*

Example:
Find the inverse of $f(x) = \frac{x+2}{3}$.

Step 1: Replace *f(x)* with *y* $y = \frac{x+2}{3}$

Step 2: Interchange *x* and *y* $x = \frac{y+2}{3}$

Step 3: Solve for *y*

$3x = y + 2$

$3x - 2 = y$

$f^{-1}(x) = 3x - 2$

Example continued:

The functions $f(x) = \frac{x+2}{3}$ and $f^{-1}(x) = 3x - 2$ are inverses because one function undoes the other.

Think of it this way!

The function $f(x) = \frac{x+2}{3}$ means:

Divide by 3 and **add** 2.

The inverse function $f^{-1}(x) = 3x - 2$ means:

Multiply by 3 and **subtract** 2.

The graph of $x = f(y)$ is the graph of $y = f(x)$ reflected in the line $y = x$.

Example:
Find the inverse and graph the function and its inverse of

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

$y = x^2 + 1$

$x = y^2 + 1$

$x - 1 = y^2$

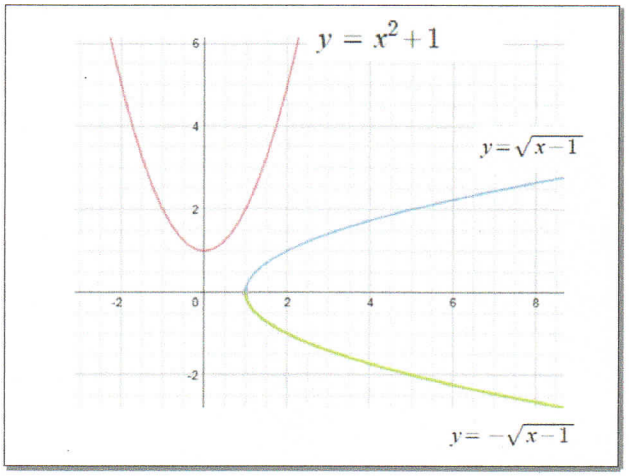
$\pm\sqrt{x-1} = y$

$y = \sqrt{x-1}$

x	y
1	0
2	1
5	2

$y = -\sqrt{x-1}$

x	y
1	0
2	-1
5	-2



Find the inverse of the following functions:

1. $f(x) = 2x + 5$

$y = 2x + 5$

$x = 2y + 5$

$\frac{x-5}{2} = \frac{2y}{2}$

$\frac{x-5}{2} = y$

$f^{-1}(x) = \frac{x-5}{2}$

2. $f(x) = 2x^2 + 3$

$y = 2x^2 + 3$

$x = 2y^2 + 3$

$\frac{x-3}{2} = \frac{2y^2}{2}$

$\frac{x-3}{2} = y^2$

$\pm\sqrt{\frac{x-3}{2}} = y$

$f^{-1}(x) = \pm\sqrt{\frac{x-3}{2}}$

3. $f(x) = \frac{1}{x-1}$

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

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

$x(y-1) = 1$

$xy - x = 1$

$\frac{xy}{x} = \frac{x+1}{x}$

$y = \frac{x+1}{x}$

$f^{-1}(x) = \frac{x+1}{x}$

4. $f(x) = \sqrt{x}$

$y = \sqrt{x}$

$x = \sqrt{y}$

$x^2 = y$

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

5. $y = 1/3(x + 1)$

$x = \frac{1}{3}(y+1)$

$3x = y + 1$

$3x - 1 = y$

$f^{-1}(x) = 3x - 1$

UNIT 4: Inverses and Transformation of Functions

Inverses

Learning Goal:

I will learn how to graph and interpret inverses of functions.

Success Criteria:

To be successful, I must be able to...

- Find the inverse of a function by:
- Replacing *f(x)* with *y*
- Interchanging *y* and *x*
- Solving for *y*

Practice Work

Pg. 215 #2, 5, 13,
Pg. 246 #1 - 6,
Pg. 248 #13 - 18