Warm-up:

$f(x) = x^2$ $g(x) = x-3$

Find:

1) $f + g$

$(x^2)+(x-3)$

$\boxed{x^2+x-3}$

2) $f - g$

$(x^2)-(x-3)$

$\boxed{x^2-x+3}$

3) $f(x) \cdot g(x)$

$x^2(x-3)$

$\boxed{x^3-3x^2}$

4) $\dfrac{f(x)}{g(x)}$

$\dfrac{x^2}{x-3}$ D: $x \neq 3$

5) $f(g(x))$

$(x-3)^2$

or

$(x-3)(x-3)$

$\underline{x^2-6x+9}$

6) $g(f(x))$

$(x^2)-3$

$\boxed{x^2-3}$

Agenda:

1) Warm-up (check w/ elbow partner)
2) Homework Questions
3) New Lesson on 5.6 Inverses
4) In class Activity/Homework

5.6 Inverse of a Function:

Learning Targets:

1) Find the inverse of a Function
2) Verify inverses of Functions

(A)Inverse Functions:

An inverse undoes what the original function did.

Example:

***Clothes…getting dressed**

Example:

function

$X = 2 \rightarrow \boxed{y = 2x} \rightarrow y = 4$ **plug into the inverse???**

$\rightarrow Y = 4$

Inverse

$\boxed{x = \frac{y}{2}} = X = 2$

(B) Finding an inverse:
To find the inverse of an equation…

Step 1: Switch the x 's and y's

Step2: solve for y

Example: switch

Y= 2x – 4

$x = 2y - 4$
$+4 \quad +4$

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

$\boxed{y = \frac{x+4}{2}}$ OR $\boxed{y = \frac{1}{2}x + 2}$

Try:
Find the inverse of:

1) y = -3x + 6

$x = -3y + 6$
$-6 \quad -6$

$\frac{x-6}{-3} = \frac{-3y}{-3}$

$y = \frac{x-6}{-3}$ or $\boxed{y = \frac{-1}{3}x + 2}$

2) $y = \frac{1}{2}x - 2$

$x = \frac{1}{2}y - 2$
$+2 \quad +2$

$2 \cdot (x+2) = (\frac{1}{2}y) \cdot 2$

$\boxed{y = 2x + 4}$

3) $y = \frac{-3}{7}x + \frac{2}{7}$

$7\left(x = \frac{-3}{7}y + \frac{2}{7}\right)$ * clear fractions

$7x = -3y + 2$
$-2 \quad -2$

$7x - 2 = -3y$

$\frac{-3y}{-3} = \frac{7x}{-3} \frac{-2}{-3}$

$\boxed{y = -\frac{7}{3}x + 2/3}$

switch for $X \leftrightarrow Y$

(c) What inverses look like: $\boxed{\text{Example}}$ $Y = X^2$

1) Table form:

X	Y
-1	1
0	0
1	1
2	4

$\longleftrightarrow$

X	Y
1	-1
0	0
1	1
4	2

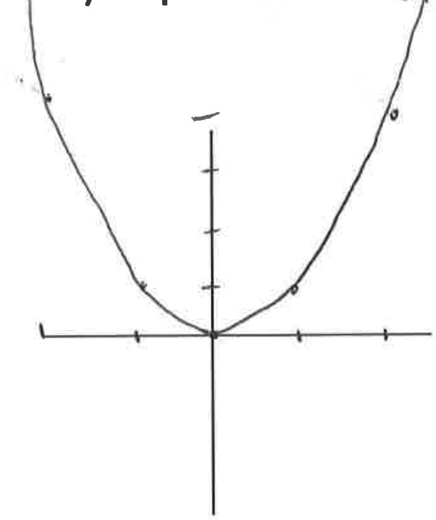
2) equation form

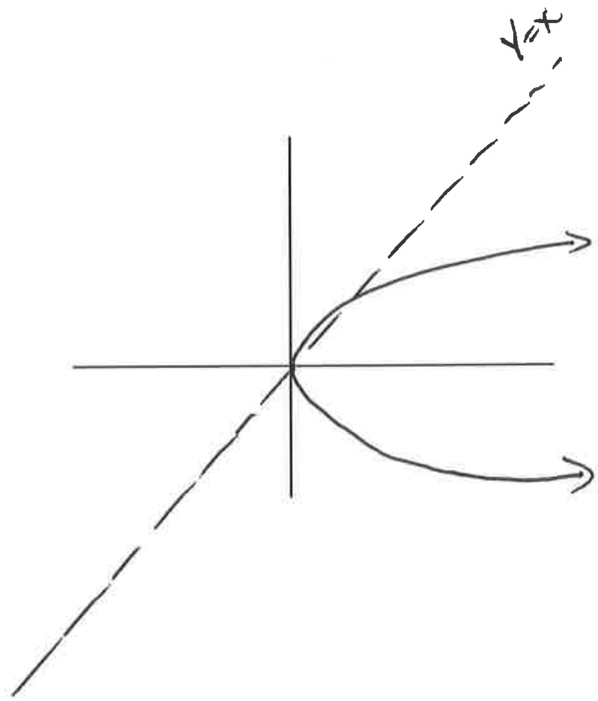
$y = x^2$

$x = y^2$

$\sqrt{y^2} = \sqrt{x}$ $\rightarrow$ $y = \pm\sqrt{x}$

3) Graph form:





(D) Verifying Inverse Functions:

To verify that 2 functions f and g are inverses:

1) f(g(x)) = x AND **2) g(f(x)) = x**

Both must be true to prove that f & g are inverses of each other.

Example:

Verify that f(x) = 2x – 4 and $g(x)=\frac{1}{2}x+2$ **are inverses**

$f\circ g = 2(\frac{1}{2}x+2)-4 \rightarrow x+4-4 = x$ ✓

$g\circ f = \frac{1}{2}(2x-4)+2 \rightarrow x-2+2 = x$ ✓

This proves they are inverses!

Try:

Verify that f(x) = -3x+6 and $f^{-1}(x)=\frac{-1}{3}x+2$ **are inverses**

$f\circ g = -3(\frac{-1}{3}x+2)+6 \rightarrow x-6+6 \rightarrow x$

$g\circ f = -\frac{1}{3}(-3x+6)+2 \rightarrow x-2+2 \rightarrow x$

(E) Finding inverses of non-linear functions

Step 1: replace f(x) with y

Step 2: switch x and y

Step 3: solve for y

Example:

$F(x) = x^2$

$y = x^2$

$x = y^2$ or

$\sqrt{y^2} = \sqrt{x}$

$\boxed{y = \pm\sqrt{x}}$

Try: $f(x) = x^5$

$y = x^5$

$x = y^5$

$\sqrt[5]{y^5} = \sqrt[5]{x}$

$y = \sqrt[5]{x}$

Try: $f(x) = \frac{1}{2}x^3 - 2$

$y = \frac{1}{2}x^3 - 2$

$x = \frac{1}{2}y^3 - 2$

$\frac{1}{2}y^3 - 2 = x$

$+2 \qquad +2$

$2\left(\frac{1}{2}y^3\right) = (x+2)2$

$\sqrt[3]{y^3} = \sqrt[3]{2x+4}$

$y = \sqrt[3]{2x+4}$

Pg. 281 (13-17, 22, 23-25, 49, 50)