Welcome! Happy Friday

-Place all cell phones in holder.

Remembering function notation.

Find the following for $f(x) = 2x^2 - 3x + 2$

a) $f(3)$ b) $f(-4)$

Inverse of Functions

Remember a function is a relationship that for every input there is exactly one output.

To determine if a relation is a function, we can use the vertical line test.

To find the inverse of a relation, simply switch the x and y coordinates.

The inverse of a relation creates a reflection over the line $y = x$.

Example # 1: Given the relation below, state the inverse. Then graph the relation & inverse. State the domain & range for the relation & inverse. Then determine if the relation & inverse are functions.

Relation:

X	0	1	2	4	8
y	2	4	5	6	7

Inverse Relation:

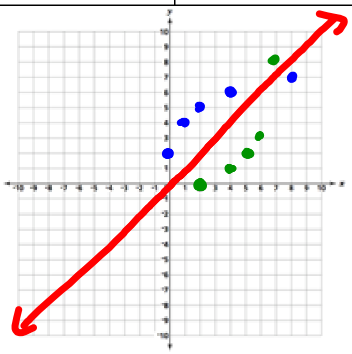
X	2	4	5	6	7
y	0	1	2	4	8

Relation

Domain:
0, 1, 2, 4, 8

Range:
2, 4, 5, 6, 7

Function?
yes



Inverse Relation

Domain:
2, 4, 5, 6, 7

Range:
0, 1, 2, 4, 8

Function?
yes

To find the inverse of a function:

1.) Rewrite f(x) as y.

2.) Switch the x and y variable and solve for y.

We denote the difference between the original function, f(x), and the inverse function as $f^{-1}(x)$ and is read as "f inverse of x".

Example # 2:	**Example # 3:**
Find the inverse of the function f(x) = $f(x) = 2x$	Find the inverse of the function $f(x)=\frac{x}{4}-5$
Step 1: Rewrite f(x) as y. $y = 2x$	Step 1: Rewrite f(x) as y. $y = \frac{x}{4} - 5$
Step 2: Switch x and y. $x = 2y$	Step 2: Switch x and y. $x = \frac{y}{4} - 5$
Step 3: Solve for y. $\frac{x}{2} = y$	Step 3: Solve for y. $x + 5 = \frac{y}{4}$ $4(x+5) = y$
Change y to $f^{-1}(x)$ to indicate the inverse function. $\boxed{f^{-1}(x) = \frac{x}{2}}$	**Change y to $f^{-1}(x)$ to indicate the inverse function.** $\boxed{f^{-1}(x) = 4x+20}$

Example # 4:
Find the inverse of the function

$$f(x) = 2\sqrt{x+1} - 4$$

Step 1: Rewrite f(x) as y. $y = 2\sqrt{x+1} - 4$

Step 2: Switch x and y. $x = 2\sqrt{y+1} - 4$

Step 3: Solve for y. $\frac{x+4}{2} = \frac{2\sqrt{y+1}}{2}$

$\left(\frac{x+4}{2}\right)^2 = \left(\sqrt{y+1}\right)^2$

$\boxed{\left(\frac{x+4}{2}\right)^2 - 1 = f^{-1}(x)}$

Change y to $f^{-1}(x)$ to indicate the inverse function.

Verifying Inverses

We can verify two functions are inverses of one another by using COMPOSITION (remember this is a function inside of another function).

To verify inverses:

1.) compose f(g(x)) = x

2.) compose g(f(x)) = x

If both compositions result in "x" then the two functions are inverses of one another.

Examples: Verify that f(x) and g(x) are inverses using compositions of functions.

# 1)	# 2)
$f(x) = 3x - 2$ $g(x) = \dfrac{(x+2)}{3}$	$f(x) = 3x - 2$ $g(x) = \dfrac{1}{3}x + 2$
$f(g(x)) = \cancel{3}\left(\dfrac{x+2}{\cancel{3}}\right) - 2$ $= x + 2 - 2$ $f(g(x)) = x$	$f(g(x)) = 3\left(\frac{1}{3}x + 2\right) - 2$ $= x + 6 - 2$ $= x + 4$

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

$$= \frac{\cancel{3}x}{\cancel{3}}$$

$$= x$$