15.4 One-to-One and Inverse Functions   Name______________________

One-To-One Functions

A function f is *one-to-one* if different inputs have different outputs. That is, if for *a* and *b* in the domain of f with $a \neq b$, we have $f(a) \neq f(b)$, then the function f is one-to-one. If a function is one-to-one, then its inverse correspondence is also a function.

The Horizontal Line Test

If it is impossible to draw a horizontal line that intersects a function's graph more than once, then the function is one-to-one. For every one-to-one function, an inverse function exists.

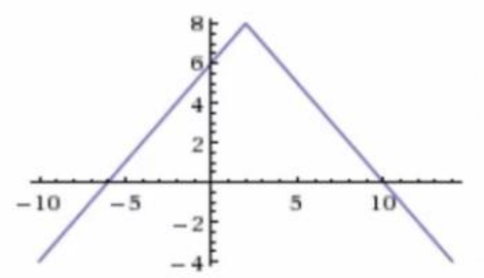
To Find a Formula for f^{-1}

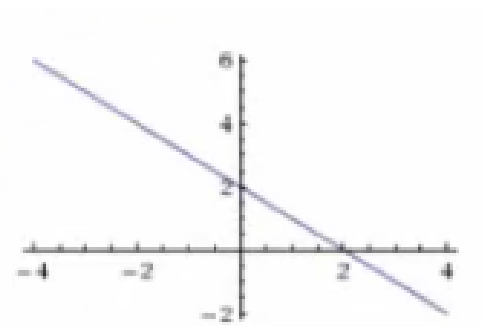
First make sure that f is one-to-one. Then replace $f(x)$ with *y*. Next interchange *x* and *y*. (This gives the inverse function.) Solve for *y*. Finally, replace *y* with $f^{-1}(x)$. (This is inverse function notation.)

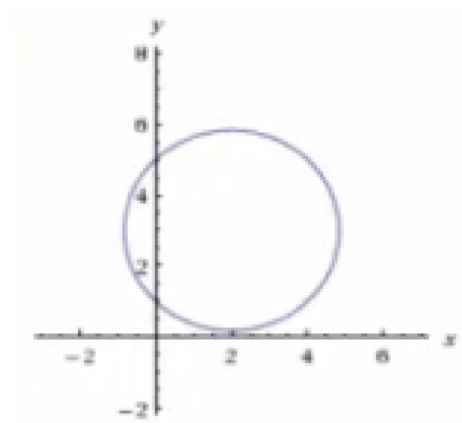
Composition of Inverse Functions Property

$f^{-1}[f(x)] = x$ and $f[f^{-1}(x)] = x$

- Do these represent One-to-One Functions?







- Determine whether the function is one-to-one; if it is one-to-one, find a formula for the inverse and graph both on the same set of axis..

1. $g(x) = 2x - 3$

2. $f(x) = x^2 - 4$

3. $H(x) = 2$

4. $g(x) = 5x + 15$

5. {(-5, -2), (-3, 2), (-1, 4), (1, 5)}

6. {(-5, -2), (-5, 2), (-1, 4), (1, 5)}

7. {(-5, -2), (-5, 2), (-1, 5), (1, 5)}

Determine if the functions are inverses of each other.

8. $h(x) = 5x - 5; \;\; f(x) = \frac{1}{5}x + \frac{1}{5}$

9. $h(x) = 3x; \;\; f(x) = \frac{1}{3x}$

10. Given $f(x) = 2x - 4$, find $f^{-1}(5)$