Goals:
1. Determine the inverse of a given function
2. Determine whether two functions are inverses
3. Graph the inverse of a function

Two functions are inverse functions if one function “undoes” what the other function “does”.

Inverse functions are just a reflection across the line *y = x*. In order for both a function $f(x)$ and its inverse $f^{-1}(x)$ to qualify as functions, $f(x)$ must be a one-to-one function.

Determining the inverse of a function:

1. Verify that $f(x)$ is a one-to-one function. (If not, its inverse is not a function.)
2. Replace $f(x)$ with *y* and exchange all *x's* and *y's.*
3. Solve for *y*.
4. Replace the new y with $f^{-1}(x)$. (Only if $f^{-1}(x)$ is actually a function.)

Example 1: If $f(x)=3x-2$, determine the inverse of the function.

Determining if two functions are inverses: (‘undo’ each other)

Two functions $f(x)$ *and* $g(x)$ are inverses of each other **if and only if**

$(f \circ g)(x)=x$ for every value of *x* in the domain of *g* and

$(g \circ f)(x)=x$ for every value of *x* in the domain of *f.*

Example 2: Determine whether $f(x)=\dfrac{x}{2x-3}$ and $g(x)=\dfrac{3x}{2x-1}$ are inverses of each other.

Graphing the inverse of a function

The graph of a function and its inverse are symmetric about the line $y = x$.

$f(x)$ is the reflection of $f^{-1}(x)$ on the line $y = x$ and vice versa.

Example 3: Given the function $f(x)=(x+2)^2+4$, graph the inverse of the function. Determine whether the inverse of the function is a function.