**MCR3U Unit 1: Introduction to functions**
**Lesson 1.4: The inverse function**

**Learning Goals:**
**I will be able to:**
- **given a function in equation form, find its inverse**
- **given a function in graphical form, find its inverse**

The inverse function

Let f(x) be a one-to-one function. Then $f^{-1}(x)$ is the inverse function of f(x).

Domain and ranges of inverse functions:
- The domain of f(x) is equal to the range of $f^{-1}(x)$.
- The range of f(x) is equal to the domain of $f^{-1}(x)$.

Steps of finding the inverse of f(x)
1) exchange the x and y values of f(x)
2) rearrange the equation to isolate for y.
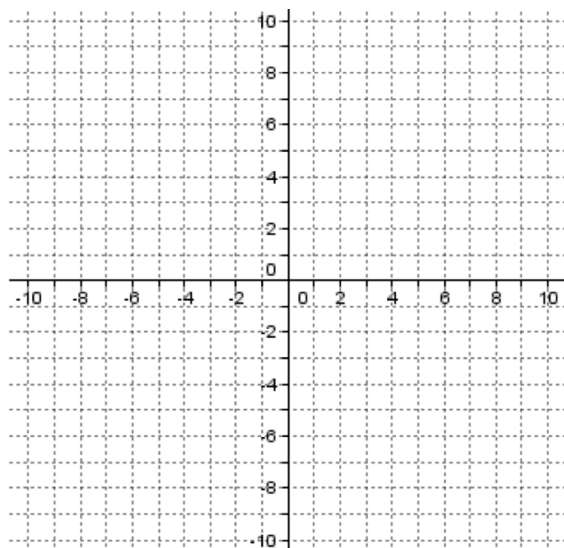3) the resulting equation is the inverse of f(x).

Example 1:

a) Find the inverse of, $g(x) = \frac{1}{x} - 2$, algebraically.

b) Find the inverse of, $g(x) = \sqrt[3]{x} - 3$, algebraically.

c) Plot the pair of each functions in Desmos and see what similarity do you notice graphically.

Example 2: Graph the inverse of $y = 2(x + 4)^2 - 1$

7. (a) If $\dfrac{1}{\cos x} - \tan x = 3$, what is the numerical value of $\sin x$?

(b) Determine all linear functions $f(x) = ax + b$ such that if $g(x) = f^{-1}(x)$ for all values of $x$, then $f(x) - g(x) = 44$ for all values of $x$. (Note: $f^{-1}$ is the inverse function of $f$.)

Practice:
Read textbook 1.5 - The inverse function and its properties
Work on pg. 46 # 1, 2, 3, 8, 9, 10, 16, 17