**2.5 Inverse Functions**

$f^{-1}(x)$ is the inverse function of $f(x)$

To find the inverse:

1. Interchange all $x$ with $y$

2. Solve for $y$

3. $y = f^{-1}(x)$

4. Domain/Range of $f(x)$ becomes Range/Domain of $f^{-1}(x)$

**Example 1:**

Determine the inverse of the following:

a.) $f(x) = 3x + 2$


b.) $f(x) = \sqrt{x+3} - 2$


c.) $f(x) = \frac{3x}{x+2}$


d.) $f(x) = x^2 + 2$

**Example 2:**

Given $f(x) = \frac{3}{x+2}$, determine

a.) $f^{-1}(x)$

b.) $f(f^{-1}(x))$

c.) $f^{-1}(f(x))$


Note:

**Domain and Range of inverse functions**:

The domain and range of an inverse function is the range and domain of the original function if the function is a one to one unction
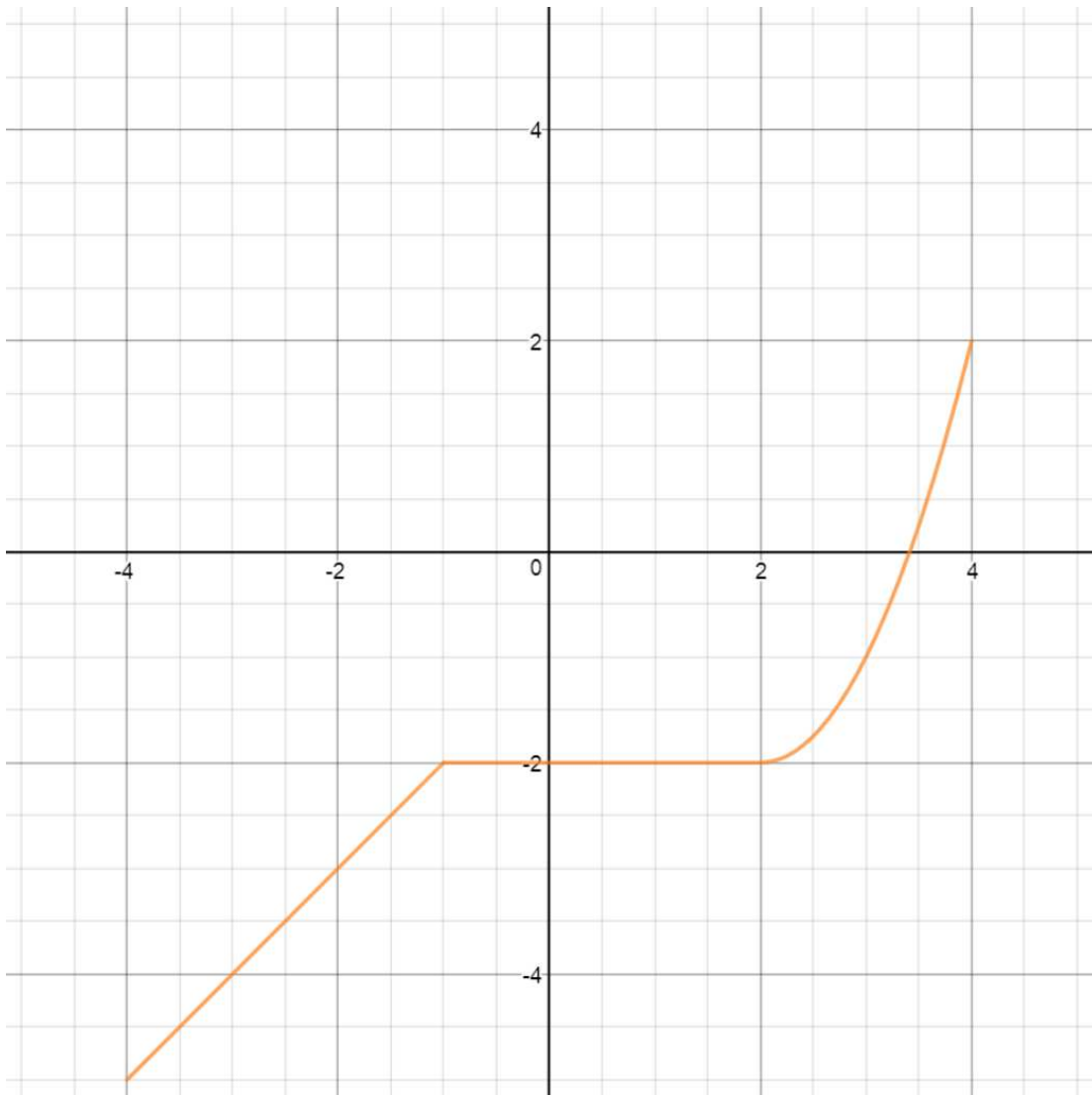
**Example 3:**

Determine the inverse of $f(x) = \sqrt{x-2} - 4$

**Graphing Inverse Relations**

To graph the inverse of the relations, find coordinates and interchange the x and y values.

The graph is also a reflection across the $y = x$ line.

**Example 4:**



<u>Transformations in Inverse functions:</u>

If $y = f(x)$ has an inverse of $y = f^{-1}(x)$ then, for the point $(a, b)$ the inverse will be $(b, a)$.
Combined with other transformations, we apply the swap first before we transform.

**Example 5:**

Point (1, 2) is a point in the function $y = f(x)$

Determine:

a.) $y = f^{-1}(x)$

b.) $y = f^{-1}(x + 1)$

c.) $y = f^{-1}(x) - 2$

d.) $-2y = f^{-1}(3x)$