

## Inverse Functions - Example 1

## Inverse Functions - Example 1

▶ We saw that if  $y = f(x)$  is a ▶ one-to-one function then we can define its inverse function:

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

as a function so that  $x = f^{-1}(f(x))$  and  $x = f(f^{-1}(x))$

## Inverse Functions - Example 1

▶ We saw that if  $y = f(x)$  is a ▶ one-to-one function then we can define its inverse function:

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

as a function so that  $x = f^{-1}(f(x))$  and  $x = f(f^{-1}(x))$

**Example:** Compute the inverse of:

$$y = f(x) = 2x + 3$$

## Inverse Functions - Example 1

▶ We saw that if  $y = f(x)$  is a ▶ one-to-one function then we can define its inverse function:

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

as a function so that  $x = f^{-1}(f(x))$  and  $x = f(f^{-1}(x))$

**Example:** Compute the inverse of:

$$y = f(x) = 2x + 3$$

The inverse function changes the **input**  $x$  of  $f$  into the **output** of  $f^{-1}$

## Inverse Functions - Example 1

▶ We saw that if  $y = f(x)$  is a ▶ one-to-one function then we can define its inverse function:

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

as a function so that  $x = f^{-1}(f(x))$  and  $x = f(f^{-1}(x))$

**Example:** Compute the inverse of:

$$y = f(x) = 2x + 3$$

The inverse function changes the **input**  $x$  of  $f$  into the **output** of  $f^{-1}$   
To get  $x$  as an output, we need to solve this equation for  $x$

## Inverse Functions - Example 1

▶ We saw that if  $y = f(x)$  is a ▶ one-to-one function then we can define its inverse function:

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

as a function so that  $x = f^{-1}(f(x))$  and  $x = f(f^{-1}(x))$

**Example:** Compute the inverse of:

$$y = f(x) = 2x + 3$$

The inverse function changes the **input**  $x$  of  $f$  into the **output** of  $f^{-1}$

To get  $x$  as an output, we need to solve this equation for  $x$

To do this, we start by **Subtracting 3** to get:

## Inverse Functions - Example 1

► We saw that if  $y = f(x)$  is a ► one-to-one function then we can define its inverse function:

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

as a function so that  $x = f^{-1}(f(x))$  and  $x = f(f^{-1}(x))$

**Example:** Compute the inverse of:

$$y = f(x) = 2x + 3$$

The inverse function changes the input  $x$  of  $f$  into the output of  $f^{-1}$

To get  $x$  as an output, we need to solve this equation for  $x$

To do this, we start by Subtracting 3 to get:

$$y-3 = 2x + 3-3$$

## Inverse Functions - Example 1

► We saw that if  $y = f(x)$  is a ► one-to-one function then we can define its inverse function:

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

as a function so that  $x = f^{-1}(f(x))$  and  $x = f(f^{-1}(x))$

**Example:** Compute the inverse of:

$$y = f(x) = 2x + 3$$

The inverse function changes the input  $x$  of  $f$  into the output of  $f^{-1}$

To get  $x$  as an output, we need to solve this equation for  $x$

To do this, we start by Subtracting 3 to get:

$$y - 3 = 2x + \cancel{3 - 3} = 2x$$



## Inverse Functions - Example 1

▶ We saw that if  $y = f(x)$  is a ▶ one-to-one function then we can define its inverse function:

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

as a function so that  $x = f^{-1}(f(x))$  and  $x = f(f^{-1}(x))$

**Example:** Compute the inverse of:

$$y = f(x) = 2x + 3$$

The inverse function changes the **input**  $x$  of  $f$  into the **output** of  $f^{-1}$

To get  $x$  as an output, we need to solve this equation for  $x$

To do this, we start by **Subtracting 3** to get:

$$y - 3 = 2x + \cancel{3 - 3} = 2x$$

Next, we need to **Divide by 2** on both sides:

## Inverse Functions - Example 1

▶ We saw that if  $y = f(x)$  is a ▶ one-to-one function then we can define its inverse function:

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

as a function so that  $x = f^{-1}(f(x))$  and  $x = f(f^{-1}(x))$

**Example:** Compute the inverse of:

$$y = f(x) = 2x + 3$$

The inverse function changes the **input**  $x$  of  $f$  into the **output** of  $f^{-1}$

To get  $x$  as an output, we need to solve this equation for  $x$

To do this, we start by **Subtracting 3** to get:

$$y - 3 = 2x + \cancel{3 - 3} = 2x$$

Next, we need to **Divide by 2** on both sides:

$$\frac{y-3}{2} = \frac{2x}{2}$$

## Inverse Functions - Example 1

▶ We saw that if  $y = f(x)$  is a ▶ one-to-one function then we can define its inverse function:

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

as a function so that  $x = f^{-1}(f(x))$  and  $x = f(f^{-1}(x))$

**Example:** Compute the inverse of:

$$y = f(x) = 2x + 3$$

The inverse function changes the **input**  $x$  of  $f$  into the **output** of  $f^{-1}$

To get  $x$  as an output, we need to solve this equation for  $x$

To do this, we start by **Subtracting 3** to get:

$$y - 3 = 2x + \cancel{3 - 3} = 2x$$

Next, we need to **Divide by 2** on both sides:

$$\frac{y-3}{2} = \frac{2x}{2} = x$$

## Inverse Functions - Example 1

▶ We saw that if  $y = f(x)$  is a ▶ one-to-one function then we can define its inverse function:

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

as a function so that  $x = f^{-1}(f(x))$  and  $x = f(f^{-1}(x))$

**Example:** Compute the inverse of:

$$y = f(x) = 2x + 3$$

The inverse function changes the **input**  $x$  of  $f$  into the **output** of  $f^{-1}$

To get  $x$  as an output, we need to solve this equation for  $x$

To do this, we start by **Subtracting 3** to get:

$$y - 3 = 2x + \cancel{3 - 3} = 2x$$

Next, we need to **Divide by 2** on both sides:

$$\frac{y-3}{2} = \frac{2x}{2} = x$$

So, we get that the inverse function is:  $x = \frac{y-3}{2}$

## Inverse Functions - Example 1

▶ We saw that if  $y = f(x)$  is a ▶ one-to-one function then we can define its inverse function:

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

as a function so that  $x = f^{-1}(f(x))$  and  $x = f(f^{-1}(x))$

**Example:** Compute the inverse of:

$$y = f(x) = 2x + 3$$

The inverse function changes the **input**  $x$  of  $f$  into the **output** of  $f^{-1}$

To get  $x$  as an output, we need to solve this equation for  $x$

To do this, we start by **Subtracting 3** to get:

$$y - 3 = 2x + \cancel{3 - 3} = 2x$$

Next, we need to **Divide by 2** on both sides:

$$\frac{y-3}{2} = \frac{2x}{2} = x$$

So, we get that the inverse function is:  $x = \frac{y-3}{2}$

Since it is customary to write the input as  $x$ , we re-write this as:

## Inverse Functions - Example 1

▶ We saw that if  $y = f(x)$  is a ▶ one-to-one function then we can define its inverse function:

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

as a function so that  $x = f^{-1}(f(x))$  and  $x = f(f^{-1}(x))$

**Example:** Compute the inverse of:

$$y = f(x) = 2x + 3$$

The inverse function changes the input  $x$  of  $f$  into the output of  $f^{-1}$

To get  $x$  as an output, we need to solve this equation for  $x$

To do this, we start by Subtracting 3 to get:

$$y - 3 = 2x + \cancel{3 - 3} = 2x$$

Next, we need to Divide by 2 on both sides:

$$\frac{y-3}{2} = \frac{2x}{2} = x$$

So, we get that the inverse function is:  $x = \frac{y-3}{2}$

Since it is customary to write the input as  $x$ , we re-write this as:

$$y = \frac{x - 3}{2}$$

## Inverse Functions - Example 1

▶ We saw that if  $y = f(x)$  is a ▶ one-to-one function then we can define its inverse function:

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

as a function so that  $x = f^{-1}(f(x))$  and  $x = f(f^{-1}(x))$

**Example:** Compute the inverse of:

$$y = f(x) = 2x + 3$$

The inverse function changes the **input**  $x$  of  $f$  into the **output** of  $f^{-1}$

To get  $x$  as an output, we need to solve this equation for  $x$

To do this, we start by **Subtracting 3** to get:

$$y - 3 = 2x + \cancel{3 - 3} = 2x$$

Next, we need to **Divide by 2** on both sides:

$$\frac{y-3}{2} = \frac{2x}{2} = x$$

So, we get that the inverse function is:  $x = \frac{y-3}{2}$

Since it is customary to write the input as  $x$ , we re-write this as:

$$y = \frac{x-3}{2}$$

Alternatively:  $f^{-1}(x) = \frac{x-3}{2}$

## Inverse Functions - Example 1

▶ We saw that if  $y = f(x)$  is a ▶ one-to-one function then we can define its inverse function:

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

as a function so that  $x = f^{-1}(f(x))$  and  $x = f(f^{-1}(x))$

**Example:** Compute the inverse of:

$$y = f(x) = 2x + 3$$

The inverse function changes the **input**  $x$  of  $f$  into the **output** of  $f^{-1}$   
To get  $x$  as an output, we need to solve this equation for  $x$

To do this, we start by **Subtracting 3** to get:

$$y - 3 = 2x + \cancel{3 - 3} = 2x$$

Next, we need to **Divide by 2** on both sides:

$$\frac{y-3}{2} = \frac{2x}{2} = x$$

So, we get that the inverse function is:  $x = \frac{y-3}{2}$

Since it is customary to write the input as  $x$ , we re-write this as:

$$y = \frac{x - 3}{2}$$

Alternatively:  $f^{-1}(x) = \frac{x - 3}{2}$

Notice:  $f^{-1}$  undoes the actions of  $f$ : **Multiplying by 2** then **Adding 3** by **Subtracting 3** then **Dividing by 2**