

Let  $f : B \rightarrow A$  be a function. An *inverse* of  $f$  is a function  $g : B \rightarrow A$  such that

$$g(b) = a \Leftrightarrow f(a) = b.$$

That is, the inverse function reverses the effect of  $f$ . If  $f(5) = 21$ , then  $g(21) = 5$ .

Suppose that  $A$  and  $B$  are subsets of  $\mathbb{R}$ , and that  $f$  is given by some formula. This is the five step process to find the inverse  $g$ . We do it with an example; let  $f(x) = 2x + 6$ .

**(Step 0)** Write the function.

$$f(x) = 2x + 6$$

**(Step 1)** Replace  $f(x)$  with  $y$ .

$$y = 2x + 6$$

**(Step 2)** Switch  $x$  and  $y$ .

$$x = 2y + 6$$

**(Step 3)** Solve for  $y$

$$2y = x - 6, \text{ so } y = \frac{1}{2}x - 3$$

**(Step 4)** Replace  $y$  with  $g(x)$

$$g(x) = \frac{1}{2}x - 3$$