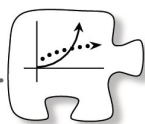


**5.1.1** How can I “undo” a function?

“Undo” Equations



**#1 Guess My Number**

When I add 4 to my number and then multiply the sum by 10, I get -70. What’s my number?  
What is the number?

**#2** Anita has a function machine. When she puts 3 into the machine, 7 comes out. When she puts 4 in, 9 comes out, and when she puts -3 in, -5 comes out.

a. What is this machine doing to the input to generate an output?

x	3		
y	7		

b. Anita’s function machine suddenly starts working backwards. If 7 is pulled back into this machine, what value do you think will come out of the top?

c. What would you expect to come out the top if 9 is entered? If -5 is entered? Explain.

d. Records the inputs and outputs of the backwards function machine in a table. Record the numbers being pulled back in as x and the numbers coming out the top as y.

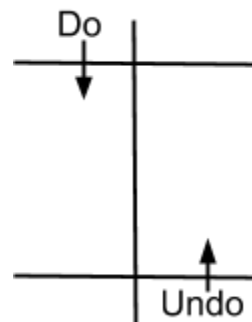
x	
y	

What is Anita’s backwards function machine is doing?

e. Write equations for Anita’s original function machine and for her backwards machine. How are the two functions related?

**#3** Given the function  $f(x) = 5x + 2$

a. Use the Do/Undo table to write an equation that will do the opposite of  $f(x)$ .



Equation:

b. An “undo” function is called an **inverse function** and has the notation  $f^{-1}(x)$ . Note that the  $-1$  is not a negative exponent. It is the mathematical symbol that indicates the inverse function of  $f(x)$ . Write an equation for  $f^{-1}(x)$ , Keiko’s “undo” function machine.

c. Make a table for  $f(x)$  and  $f^{-1}(x)$  what do you notice?

x	-2	-1	0	1	2
y					

x	-8	-3	2	7	12
y					

**#4** Keiko is working with a new function,  $g(x)$ . She writes down the following steps for  $g(x)$ :

- Add 5.
- Divide by 2.
- Cube it.
- Multiply by 6.

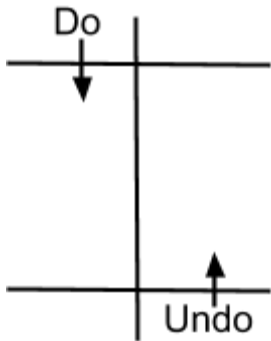
a. What is the equation for  $g(x)$ ? What is the output when 3 is the input?

b. Help Keiko write down the steps (in words) for the inverse machine,  $g^{-1}(x)$ , and then write its equation.

c. Verify that your inverse equation in part (b) correctly “undoes” the output of  $g(x)$  you calculated in part (a). (That is, use 360 as your input. You should get an output of 3.)

#5 What are the inverse functions for each of the functions below? Use function notation. Justify that each equation for the inverse works.

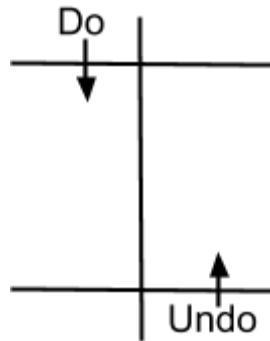
a.  $f(x) = 3x - 6$



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

Check that they are inverses:

b.  $g(x) = x^3 - 5$



$g^{-1}(x) =$

Check that they are inverses:

c.  $p(x) = 2(x + 3)^3$

$p^{-1}(x) =$

Check:

d.  $t(x) = \frac{10(x-4)}{3}$

$t^{-1}(x) =$

Check: