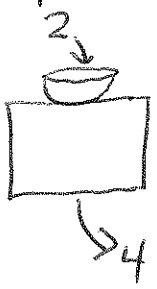
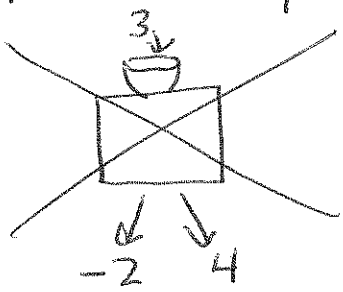
2.1/2.2C Function Representation and Evaluation

A. "Function Machine"

Since each x-value is allowed only <u>one</u> y-value in a function, we can think of a function as a "machine" that "eats" x-values and spits back y-values, so that the machine only spits back one output for any input:



YES



No

We call our "machine" that changes x-values into y-values <u>a function operator</u>, written f

f represents the function.

B. Notation

$$y = f(x)$$

- y: output
- f: function operator
- x: input

C. Comments

1. The function operator f is written in cursive. This is done to distinguish the algebra of variables from the algebra of functions (discussed later)

In particular, $x^{-1} = \frac{1}{x}$, but

it is not true that ~~$f^{-1}(x) = \frac{1}{f(x)}$~~

(see later)

2. Interpretation:

x input

f function operator; represents the function; operates on input x to produce output y

y output

$f(x)$ output of the function f this is the same as y.

3. $f(x)$ does not represent the function; f does. $f(x)$ is the output to the function for input x.

D. Evaluation

An expression $f(x)$ is a formula for the output to the function f for input x. If 3 is an input, then $f(3)$ is the output.

E. Examples

Consider $f(x)=x^2+1$. Evaluate the following:

Example1: Find $f(3)$

Solution

We want the y-value when $x=3$

$f(x)=x^2+1$ is the formula for all y-values, so plug in 3:

$f(3)=3^2+1=10$

Ans: $\boxed{10}$

Example2: Find $f(0)$

Solution

We want the y-value when $x=0$

$f(x)=x^2+1$ is the formula for all y-values, so plug in 0:

$f(0)=0^2+1=1$

Ans: $\boxed{\bullet 1}$

Note: We don't put the answers in a set, since we are not solving an equation.