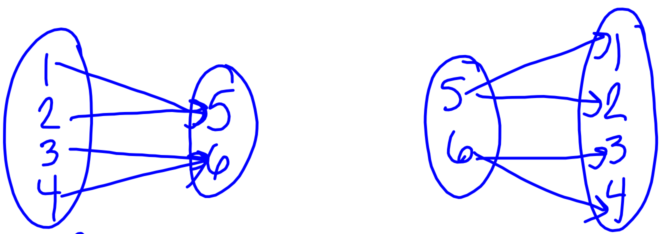
Sec. 6.7 Inverse Relations and Functions

Vocabulary

inverse relation: If a relation pairs element a of its domain to element b of its range, the inverse relation pairs b with a.

inverse functions: both a relation and its inverse happen to be functions

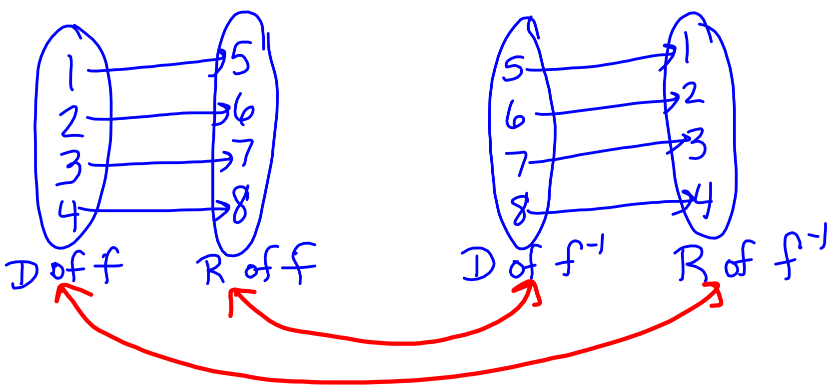
not inverse functions



function   not a function

one-to-one function:
- each x-value corresponds to exactly one y-value
- each y-value corresponds to exactly one x-value

f   inverse: f^{-1}



$$f^{-1}(\underbrace{f(2)}_{f^{-1}(6)}) = 2 \qquad f(f^{-1}(8)) = 8$$

Composition of Inverse Functions

If f and f^{-1} are inverse functions, then

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

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

* Note: An inverse is a reflection across the line (of symmetry) $y=x$.

To find an inverse of a function:

1. Replace $f(x)$ with y
2. Switch x and y.
3. Solve for y.
4. If a function, replace y with $f^{-1}(x)$.

$f(x) = x + 3$

1. $y = x + 3$
2. $x = y + 3$
   $\quad -3 \quad\; -3$
3. $x - 3 = y$
   $y = x - 3$
4. $f^{-1}(x) = x - 3$