Another example

- Let $A = B = \{0, 1, 2, \ldots, 9\}$, and let

$$f(x) = 7x \pmod{10}$$

x	0	1	2	3	4	5	6	7	8	9
$f(x)$	0	7	4	1	8	5	2	9	6	3

- Note that every number appears exactly once in the bottom row!
- Therefore f is a bijection (and a permutation) — So what is the inverse??
- We compute:

y	0	1	2	3	4	5	6	7	8	9
$f^{-1}(y)$	0	3	6	9	2	5	8	1	4	7

- And, hey, look at this:

$$f^{-1}(y) = 3y \pmod{10}.$$

- This is because $3 \cdot 7 \equiv 1 \pmod{10}$:

$$f^{-1}(f(x)) \equiv 3(7(x)) \pmod{10} \equiv 21x \pmod{10} \equiv 1x \pmod{10} \equiv x \pmod{10}$$
$$f(f^{-1}(y)) \equiv 7(3(y)) \pmod{10} \equiv 21y \pmod{10} \equiv 1y \pmod{10} \equiv y \pmod{10}.$$