Example 1

- We saw that $f : \mathbb{R} \to \mathbb{R}$ with $f(x) = x^2$ is neither injective nor surjective.
- But if restrict the domain and codomain to $\mathbb{R}^{\geq 0}$...
- $f : \mathbb{R}^{\geq 0} \to \mathbb{R}^{\geq 0}$ is both injective and surjective!
- Therefore it should have an inverse, but we can guess what it should be:

$$f^{-1}(y) = \sqrt{y}.$$

- Check:

$$g(f(x)) = \sqrt{f(x)} = \sqrt{x^2}$$

  Generally, this is $|x|$, but since $x \geq 0$ this is x itself!
- Check:

$$f(g(y)) = (g(y))^2 = (\sqrt{y})^2 = y.$$