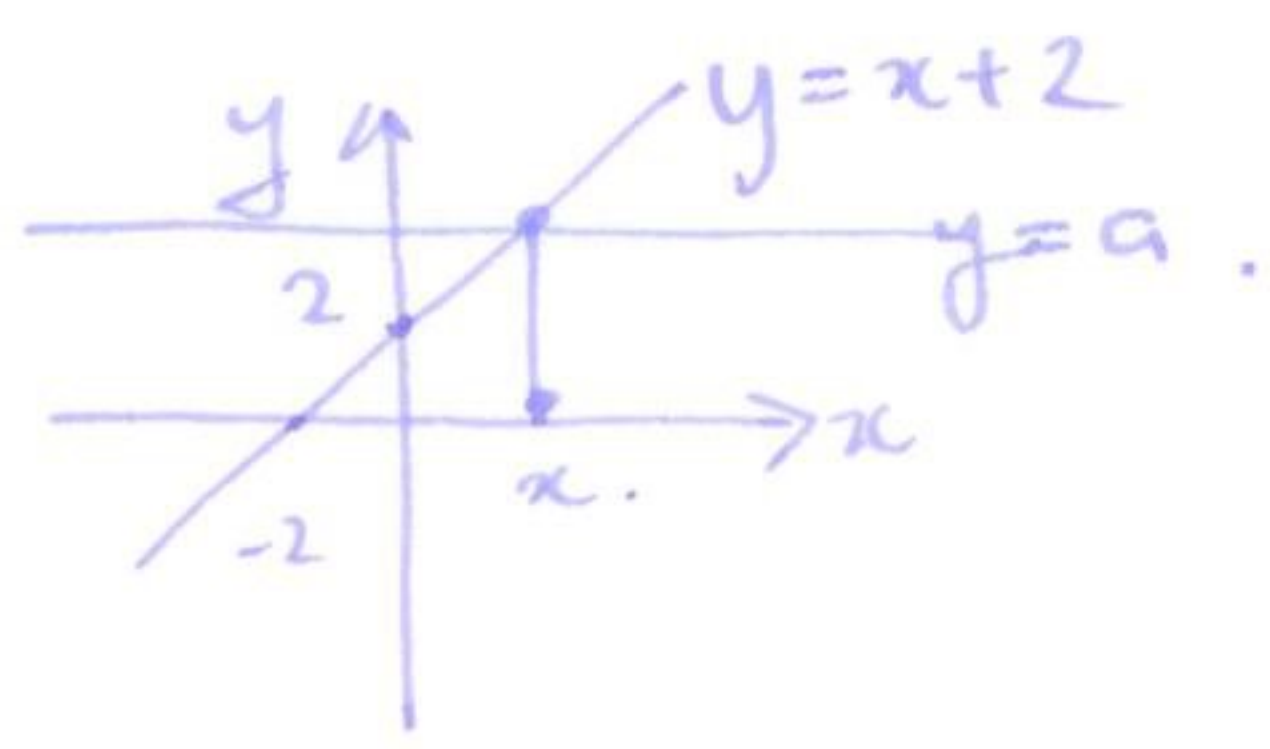


$$f: \mathbb{R} \xrightarrow{f} \mathbb{R}$$

$$x \mapsto f(x)$$

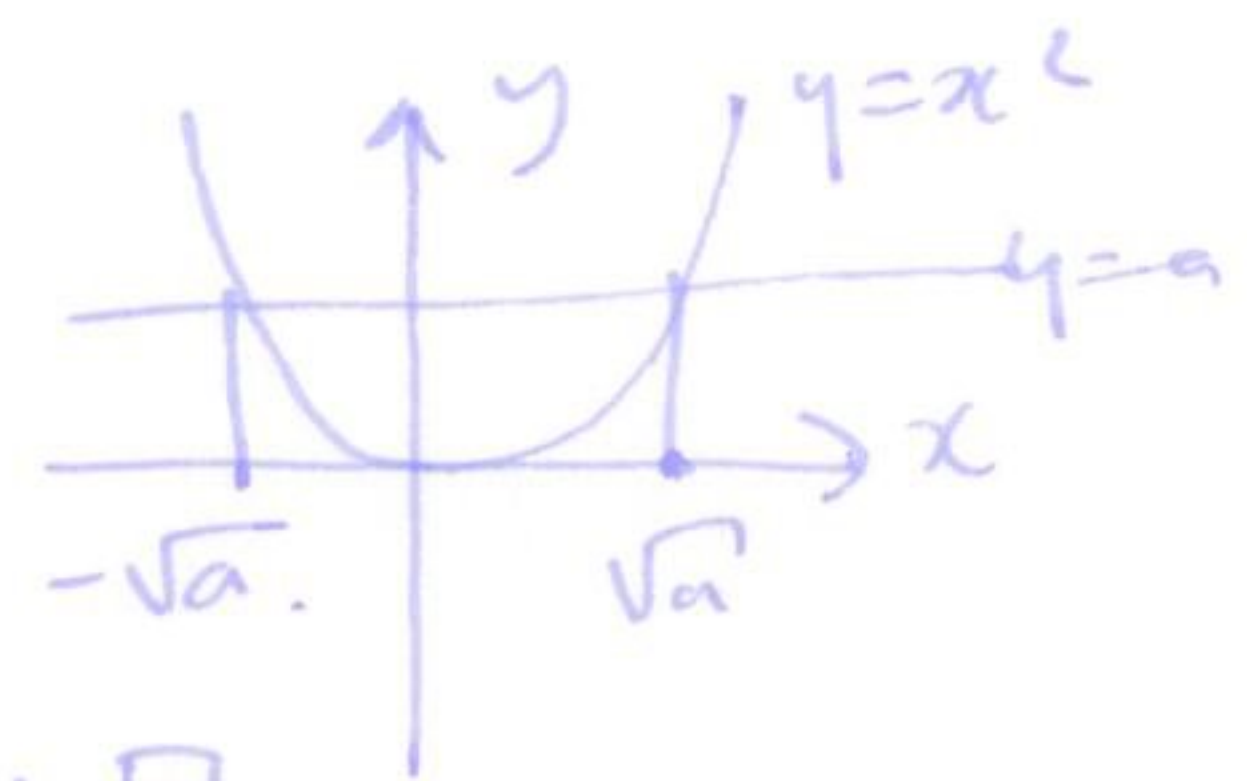
Q: when can we go backwards?
i.e. given $f(x)$ can we work out what x was?

Example (good) $f(x) = x + 2$



if $y = x + 2 = a$
then $x = y - 2$

Example (bad) $f(x) = x^2$



if $x^2 = a$
don't know whether x was $\pm\sqrt{a}$.

Defn A function is one-to-one or injective if

- different inputs have different outputs.
 $a \neq b \Rightarrow f(a) \neq f(b)$
 - same outputs ^{came from} have same input.
 $f(a) = f(b) \Rightarrow a = b$
- equivalent! (contrapositive)
 $A \Rightarrow B$
same as not $B \Rightarrow$ not A .

Defn Let $f: A \rightarrow B$ be a function.

the inverse function $f^{-1}: B \rightarrow A$ is a function
such that $f^{-1}(f(x)) = x$ for all $x \in A$.

warning: not every all functions have inverses.

warning: f^{-1} does not mean $\frac{1}{f}$. !!! (bad notation).

