$$f(x) = ax + b \qquad a \neq 0$$

$$y = ax + b \qquad x = \frac{1}{a}y - \frac{b}{a}$$

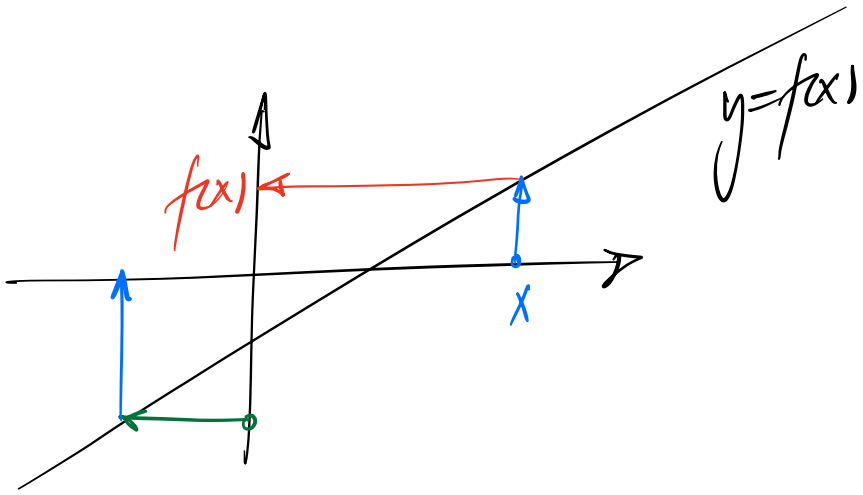
$$\Leftrightarrow \quad y - b = ax \qquad g(y) = \frac{1}{a}y - \frac{b}{a}$$

$$\Leftrightarrow \quad \frac{y-b}{a} = x \qquad \boxed{g(x) = \frac{1}{a}x - \frac{b}{a}}$$

$$f \circ g(x) = g \circ f(x) = x$$

$$f(g(x)) = a\left(\frac{1}{a}x - \frac{b}{a}\right) + b = x - b + b = x$$

$$g(f(x)) = \frac{1}{a}(ax + b) - \frac{b}{a} = x + \frac{b}{a} - \frac{b}{a} = x \quad \checkmark$$

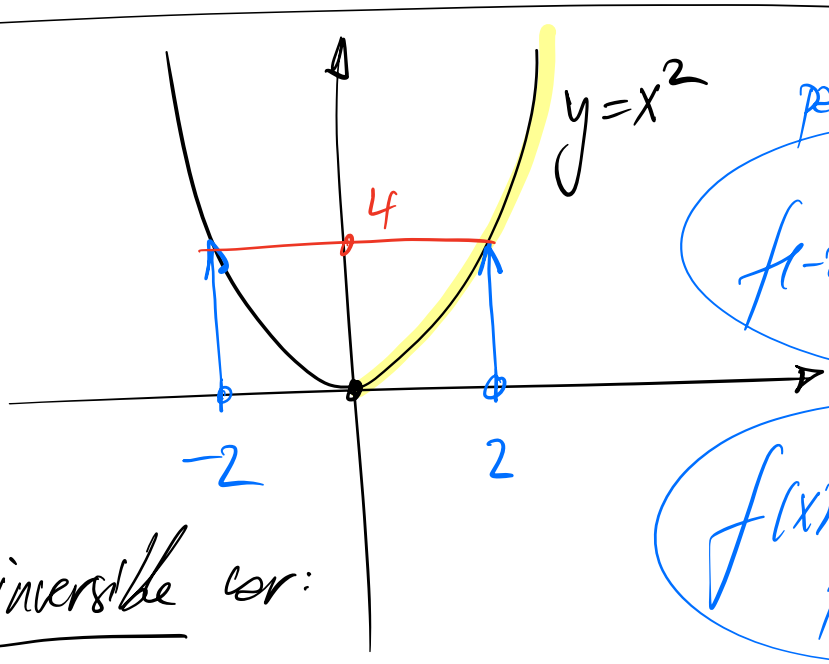


f est **bijective** sur $\mathbb{R}$: f est une bijection

$\forall x \in \mathbb{R} \ \exists ! y \in \mathbb{R}$ tq. $f(x) = y$

$\forall y \in \mathbb{R} \ \exists ! x \in \mathbb{R}$ tq. $f(x) = y$

$f(x) = x^2$



pas injective

$f(-2) = f(2) = 4$

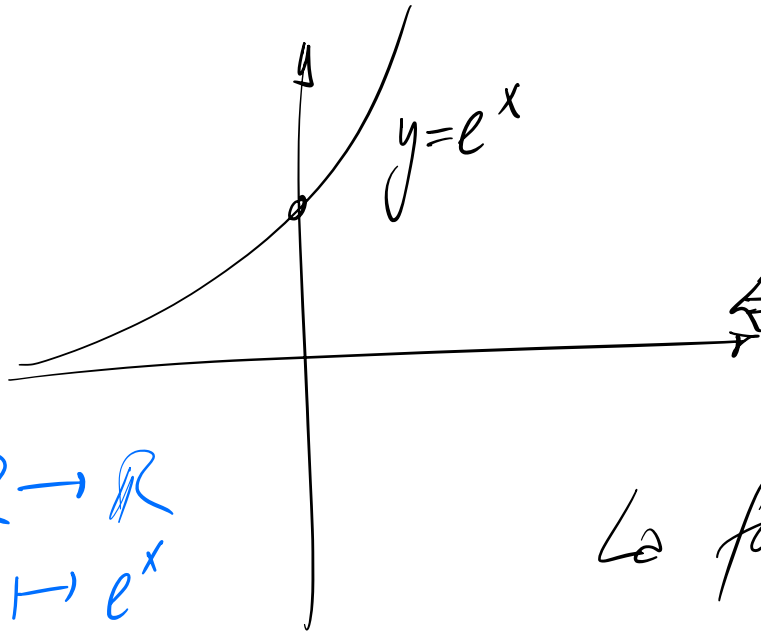
$f(x) = -1$ pas de sol.

f n'est pas inversible car :

$y = x^2 \Leftrightarrow x = \pm\sqrt{y}$ ← 2 possibilités

f n'est pas bijective.

pas surjective



Si $x \neq y$ alors $e^x \neq e^y$

$\Leftrightarrow$ Si $e^x = e^y$ alors $x=y$

$\mathbb{R} \to \mathbb{R}$
$x \mapsto e^x$

La fonction exponentielle est injective.

Mais $e^x = -1$ n'a pas de sol.

Elle n'est pas surjective.

Def. Soit $f : E \to F$ avec $E, F \subset \mathbb{R}$

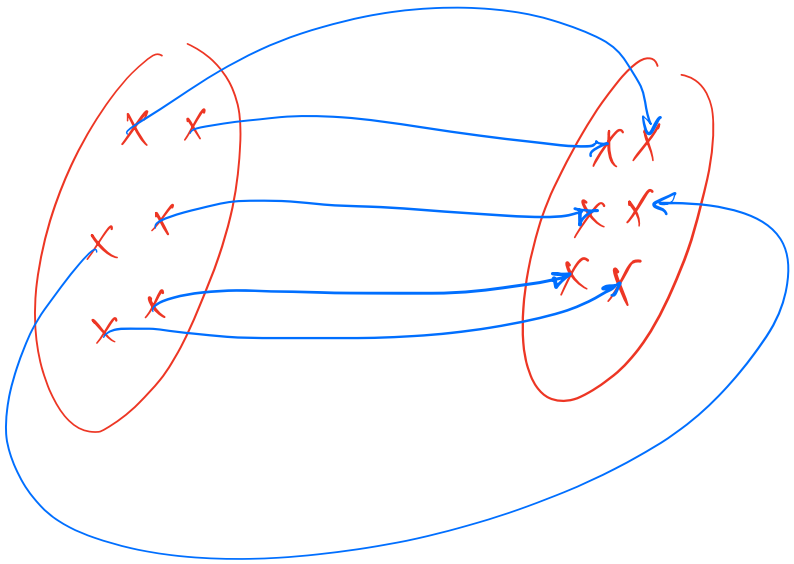
On dit que f est injective si $\forall x,y \in E$

$$f(x) = f(y) \Rightarrow x = y$$

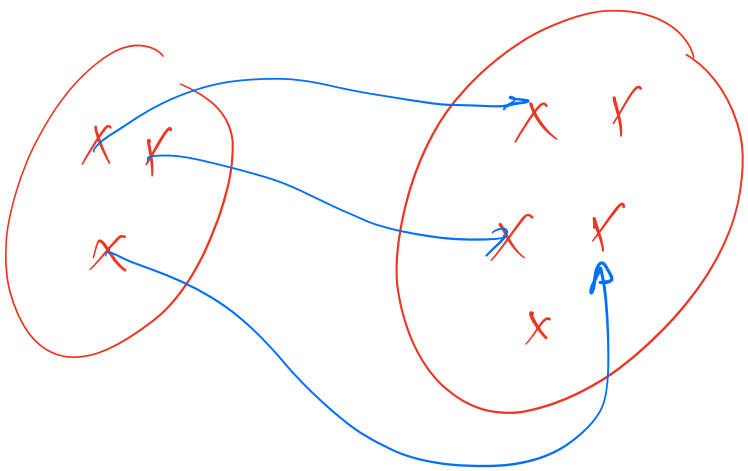
On dit que f est surjective si $\forall y \in F \; \exists x \in E$

tq. $y = f(x)$

On dit que f est bijective si elle est à la fois injective et surjective.

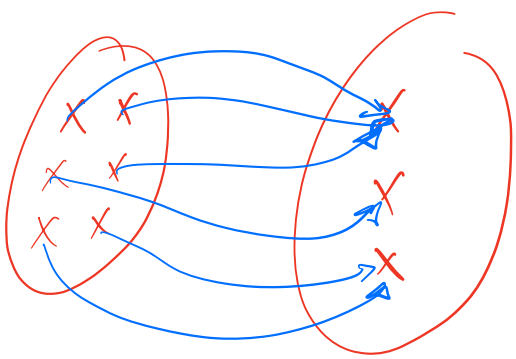


bijective



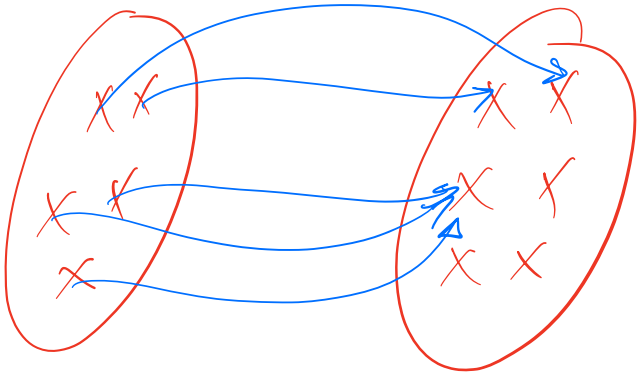
injective

~~surjective~~



surjective

~~injective~~



~~injection~~

~~surjection~~