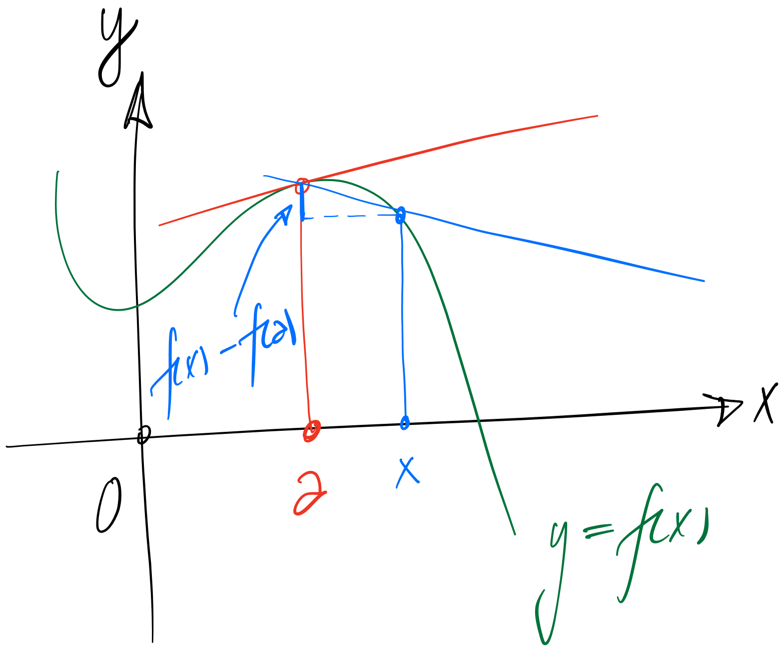
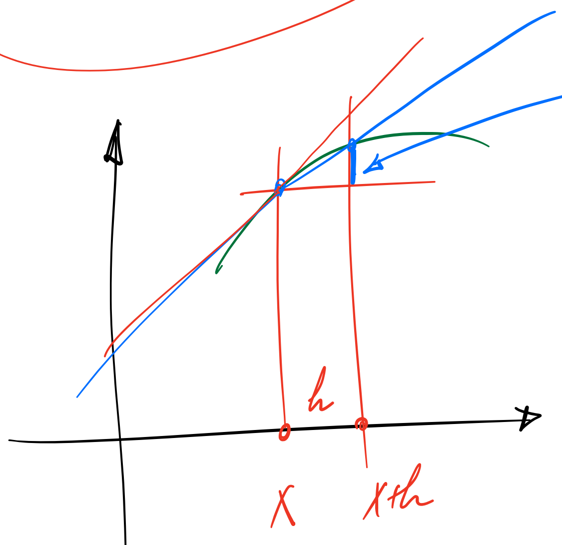


Definiția de $f'(x)$

$$\lim_{x \to a} \frac{f(x) - f(a)}{x - a} = f'(a)$$



$f(x+h) - f(x)$

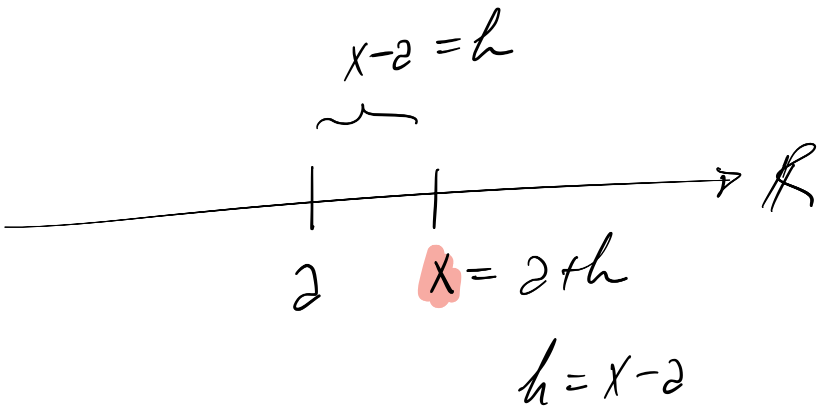
$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{x+h-x}$$

$$= \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$f'(a) = \lim_{x\to a} \frac{f(x)-f(a)}{x-a}$$

$x = a+h$

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$



$$(x^3)' = 3x^2$$

$$\lim_{h\to 0} \frac{(x+h)^3 - x^3}{h} = \lim_{h\to 0} \frac{\cancel{x^3} + 3x^2h + 3xh^2 + h^3 \cancel{- x^3}}{h}$$

$$= \lim_{h\to 0} \frac{\cancel{h}\,(3x^2 + 3xh + h^2)}{\cancel{h}}$$

$$= \lim_{h\to 0} 3x^2 + \underbrace{3xh + h^2}_{\downarrow\, 0} = 3x^2 \quad \checkmark$$

$$\sum_{k=0}^{\infty} \frac{x^k}{k!} = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \dots = e^x$$

$\frac{2x}{2}$

$(1)' = 0$ $(x)' = 1$

$r = \infty$ absolument convergente sur $\mathbb{C}$

$$\frac{d}{dx} e^x = \frac{d}{dx}\left(\sum_{k=0}^{\infty} \frac{x^k}{k!}\right) = \sum_{k=0}^{\infty} \frac{d}{dx}\left(\frac{x^k}{k!}\right)$$

thm

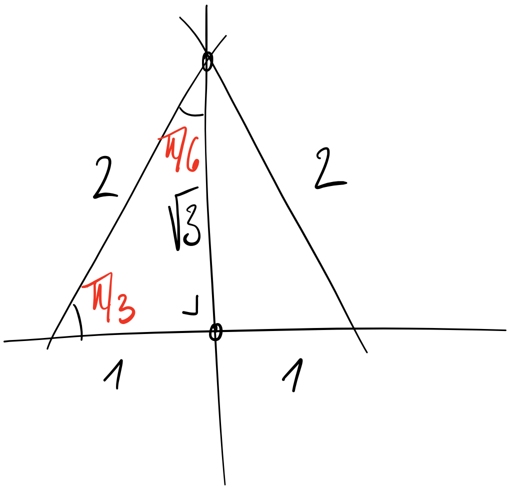
$$= \sum_{k=1}^{\infty} \frac{k \cdot x^{k-1}}{k!}$$

$$\frac{k}{k!} = \frac{k \cdot 1}{k \cdot (k-1)!}$$

$$= \sum_{k=1}^{\infty} \frac{x^{k-1}}{(k-1)!}$$

$$= \sum_{p=0}^{\infty} \frac{x^p}{p!} = e^x$$

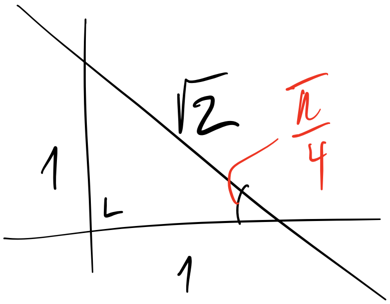
$$\Rightarrow \frac{d}{dx} e^x = e^x$$



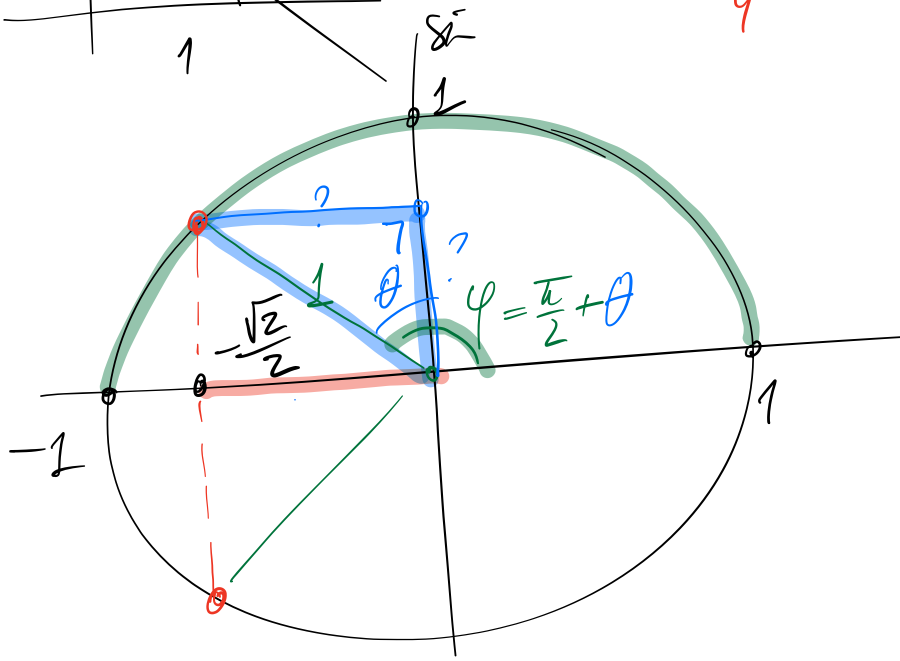
$$\sin\frac{\pi}{6} = \frac{1}{2}$$

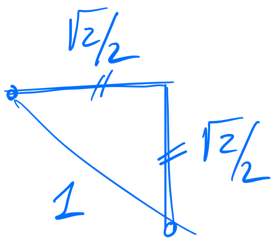
$$\tan\frac{\pi}{6} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\tan\frac{\pi}{3} = \sqrt{3}$$



$$\tan\frac{\pi}{4} = 1 \qquad \sin\frac{\pi}{4} = \cos\frac{\pi}{4} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$



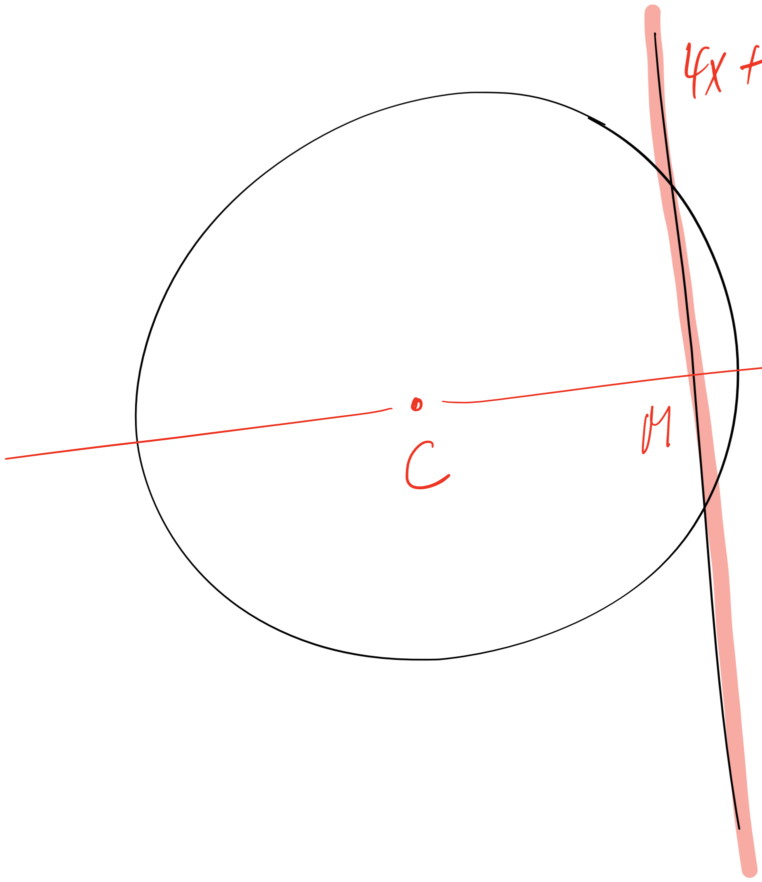


$$\left(\frac{1}{\sqrt{2}}\right)^2 + \left(\frac{1}{\sqrt{2}}\right)^2 = 1$$

$$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\arccos\left(-\frac{\sqrt{2}}{2}\right)$$

$$\arccos : [-1;1] \longrightarrow [0;\pi]$$



$4x+y+7z-13=0$

d_1 par C

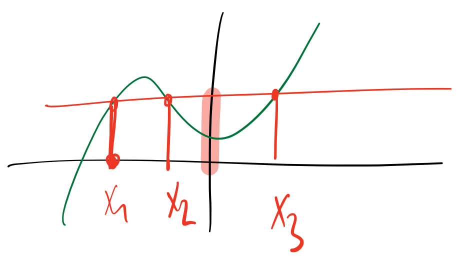
$$d_1 : \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \boxed{C + k \cdot \begin{pmatrix} 4 \\ 1 \\ 7 \end{pmatrix}}$$

$f : E \longrightarrow F$ $\quad$ E, F des parties de $\mathbb{R}$

f est injective si

$$\boxed{\forall x_1, x_2 \in E \quad f(x_1) = f(x_2) \Rightarrow x_1 = x_2}$$

($f(x_1) = f(x_2)$ avec $x_1 \neq x_2$ exclu)

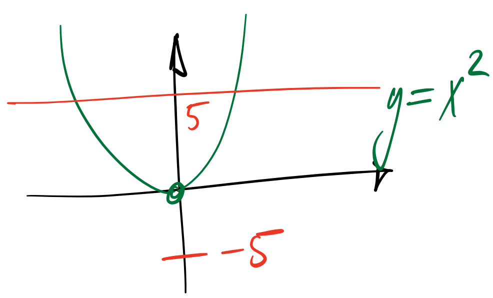


$f(x_1) = f(x_2) = f(x_3)$ alors que

$x_1 \neq x_2 \neq x_3$

f est surjective si

$$\boxed{\forall y \in F \ \exists x \in E \ \text{tq. } f(x) = y}$$



$\sin : \mathbb{R} \longrightarrow [-1;1]$

$\arccos : [-1;1] \longrightarrow [0;\pi]$

$\mathbb{R} - \{1\} \longrightarrow \mathbb{R} - \{1\}$

$x \longmapsto \dfrac{x-2}{x-1}$

$[0;+\infty[\longrightarrow [0;+\infty[$

$x \longmapsto \sqrt{x}$

$\mathbb{R} \longrightarrow [0;+\infty[$

$x \longmapsto x^2$

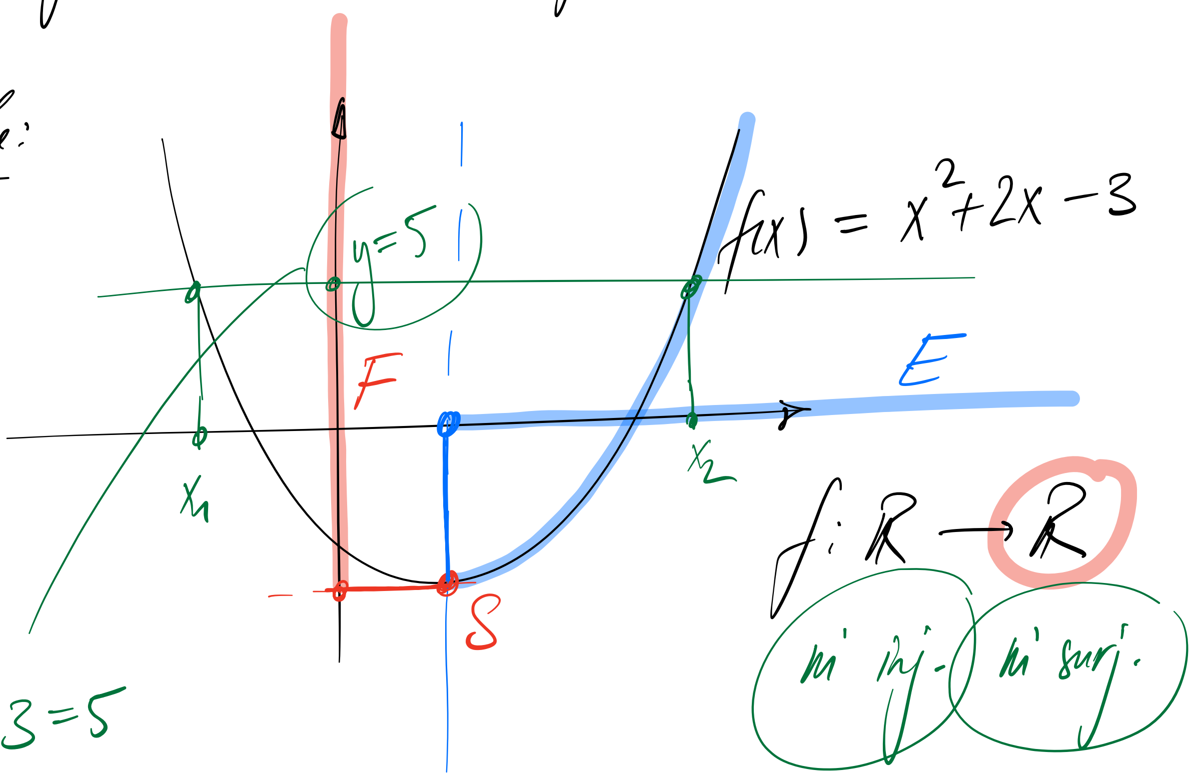
Si $\mathbb{R} \to \mathbb{R}$ n'est pas surjective

$f : \mathbb{R} \to [0;+\infty[$ est surjective
$x \mapsto x^2$

$y \in [0;+\infty[\Rightarrow f(\sqrt{y}) = y \Rightarrow x = \sqrt{y}$ convient

f est bijective si elle est $\boxed{\text{injective \& surjective.}}$

Exemple:



$x^2+2x-3=5$

$f : E \to F$ est une bijection.

Dans ce cas, $\exists\ f^{r} : F \to E$ tq. $f^{r}(f(x)) = x$

$x^2+2x-3 = y \Leftrightarrow x^2+2x-3-y = 0 \Leftrightarrow x = \dfrac{2 \pm \sqrt{4+4(3+y)}}{2}$ si $y > -4$

$$[0;+\infty[\longrightarrow [0;+\infty[$$

$$x \longmapsto x^2$$

$$\boxed{\begin{aligned} f(x) &= x^2 \\ f^{r}(x) &= \sqrt{x} \end{aligned}}$$

$$f(x) = y$$

$$x^2 = y$$

$$x = \sqrt{y}$$