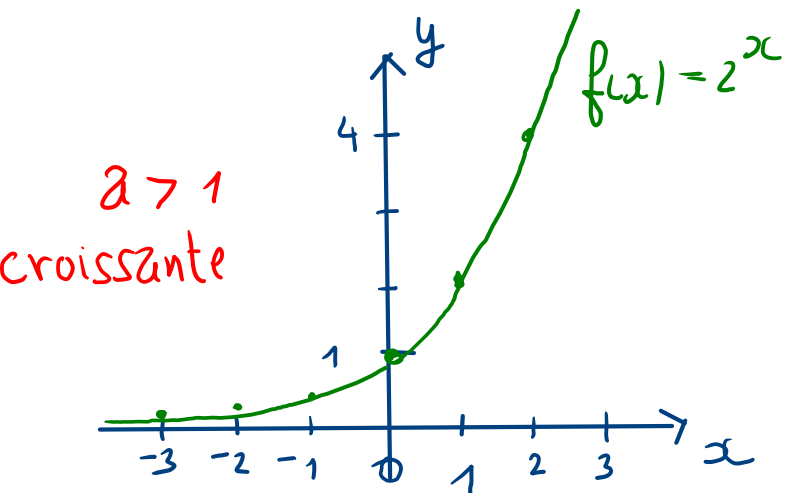


Fonction exponentielles

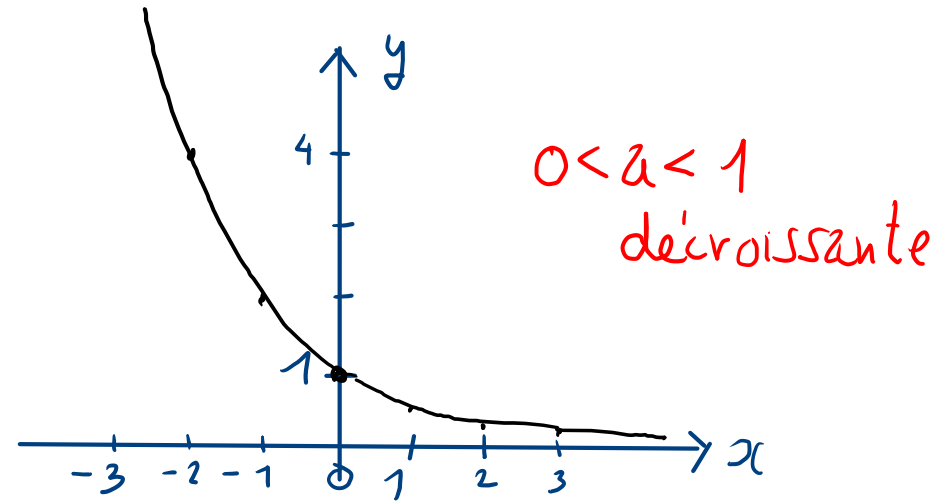
Soit $a > 0$, $a \neq 1$, $f(x) = a^x$ est appelée fonction exponentielle



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

$$\lim_{x \rightarrow +\infty} 2^x = +\infty$$

$$\lim_{x \rightarrow -\infty} 2^x = 0$$



$$f(x) = \left(\frac{1}{2}\right)^x$$

$$\lim_{x \rightarrow +\infty} \left(\frac{1}{2}\right)^x = 0$$

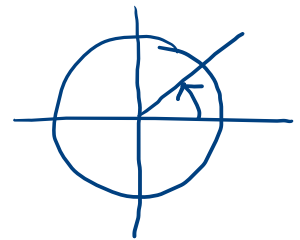
$$\lim_{x \rightarrow -\infty} \left(\frac{1}{2}\right)^x = +\infty$$

Propriété:

$$a^x = a^y \Leftrightarrow x = y$$

$$\sinh(x) = \sinh(x + 2\pi)$$

$$\sinh(x) = \sinh(y) \Leftrightarrow x = y$$



4.2.1 Résoudre les équations ci-dessous :

a) $7^{x+6} = 7^{3x+4} \Leftrightarrow x+6 = 3x+4 \Leftrightarrow 2x = 2 \Leftrightarrow x = 1$

b) $6^{7-x} = 6^{2x+1}$

c) $3^{2x+3} = 3^{(x^2)} \Leftrightarrow 2x+3 = x^2 \Leftrightarrow x = -1 \text{ ou } x = 3$
 $x^2 - 2x - 3 = 0$

d) $9^{(x^2)} = 3^{3x+2} \Leftrightarrow (3^2)^{x^2} = 3^{3x+2} \Leftrightarrow \underline{3}^{2x^2} = \underline{3}^{3x+2}$

e) $2^{-100x} = 0,5^{x-4} \Leftrightarrow \Leftrightarrow 2x^2 = 3x + 2 \dots$

f) $\left(\frac{1}{4}\right)^{6-x} = 4$

$$2^{-100x} = (2^{-1})^{x-4} \Leftrightarrow 2^{-100x} = 2^{-x+4}$$
$$\Leftrightarrow -100x = -x + 4 \dots$$

$$g) 27^{x-1} = 9^{2x-3}$$

$$h) 2^x \cdot 4^x = -5$$

< 0

$$i) (5^{x-2})^4 = 125 \cdot 5^{5x-3}$$

$$j) (3^{x-1})^3 = 9 \cdot 3^{x-2}$$

$$k) 3^{4x+2} - 36 \cdot 3^{2x+1} = -243$$

$$l) 5 \cdot 5^{4x-7} - 120 \cdot 5^{2x-3} = 625$$

h) Pas de solution

$$i) 5^{4x-8} = 5^3 \cdot 5^{5x-3}$$

$$5^{4x-8} = 5^{5x}$$

$$\Leftrightarrow 4x-8 = 5x \Leftrightarrow x = -8$$

$$k) 3^{4x+2} - 36 \cdot 3^{2x+1} + 243 = 0$$

$$\left(\underset{y}{3^{2x+1}} \right)^2 - 36 \cdot \underset{y}{3^{2x+1}} + 243 = 0$$

Effectuons un changement de variable : $3^{2x+1} = y, y > 0$

On résout : $y^2 - 36y + 243 = 0$

Mardi :