terça-feira, 7 de março de 2023 15:25

$a^c = b \rightarrow 2^3 = 8$

$3^4 = 81$

$2^{-1} = \frac{1}{2}$

$3^{-2} = \left(\frac{1}{3}\right)^2 = \frac{1}{9}$

$\log_a b = c \Leftrightarrow a^c = b$

$\frac{1}{8} = \frac{1}{2^3} = \left(\frac{1}{2}\right)^3 = 2^{-3}$

$\log_2 8 = 3$

$\log_2 \frac{1}{8} = -3$

$\log_3 81 = 4$

$\log_{\frac{1}{2}} 32 = -5$

$\log_{10}(\ ) = \log(\ ) \quad | \quad \ln(\ ) = \log_e(\ )$

$\ln(e) = \log_e e = 1$

$$\log_2 32 = \log_2 2^5 = 5$$

32	2
16	2
8	2
4	2
2	2
1	2^5

$$2^{\log_2 8} = 2^3 = 8$$

$$\log_a\left(\frac{M}{N}\right) = \log_a(M \cdot N^{-1}) = \log_a M + \log_a N^{-1}$$

$$\log_a M - \log_a N$$

$$\log_a(M^N) = \log_a(\underbrace{M \cdot M \cdot M \cdots M}_{N \text{ vezes}}) =$$

$$= \log_a M + \log_a M + \cdots + \log_a M$$

$$\log_a(M^N) = N \log_a M$$

$$\log_b N = \frac{\log_a N}{\log_a b}$$

Exemplos

$$\log_9 81 = \frac{\ln(81)}{\ln(9)} = 2$$

$$\log_2 27 = \frac{\log 27}{\log 2} \simeq 4{,}75$$

Função logarítmica

$a > 0$, $a \neq 1$

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

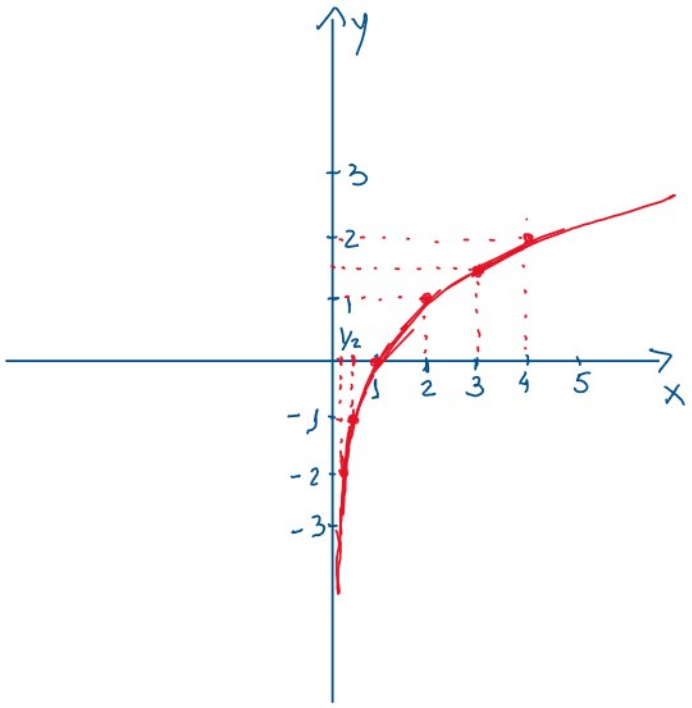
$$D(f) = \{x \in \mathbb{R} / x > 0\} =]0, \infty[= \mathbb{R}_*^+$$

$$Im(f) = \mathbb{R}$$

Exemplo

a) $f(x) = \log_2(x)$ $\quad D(f) = \mathbb{R}_*^+$ $\quad Im(f) = \mathbb{R}$

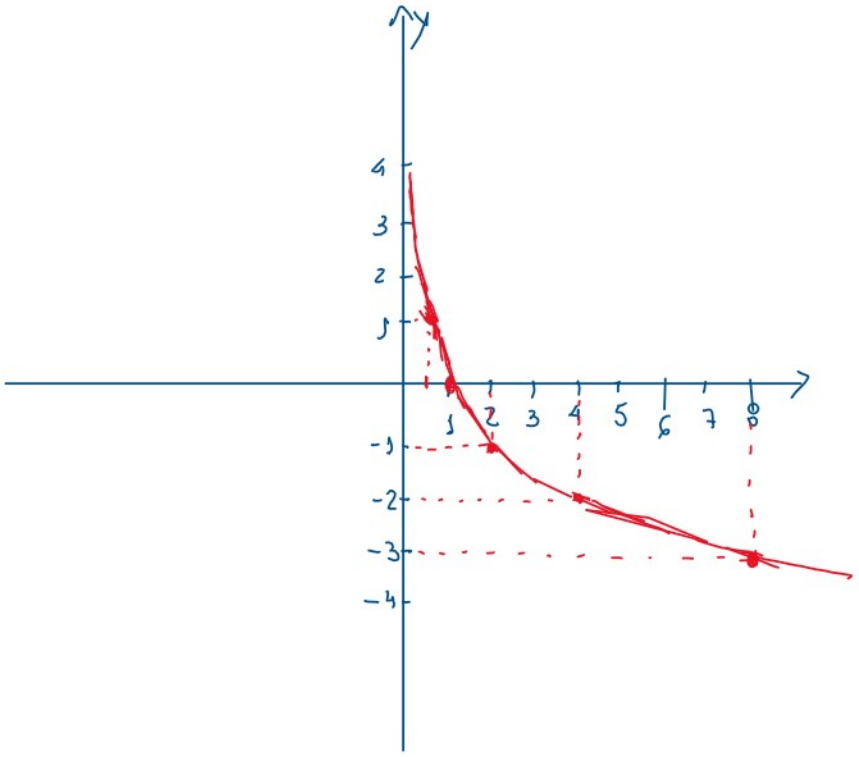
x	$f(x)$
1	$\log_2 1 = 0$
2	$\log_2 2 = 1$
4	$\log_2 4 = 2$
3	$\log_2 3 = 1{,}58$
$\frac{1}{2}$	$\log_2(\frac{1}{2}) = -1$
$\frac{1}{4}$	$\log_2(\frac{1}{4}) = -2$



b) $f(x) = \log_{\frac{1}{2}}(x)$

$D(f) = \mathbb{R}_*^+$ $\quad$ $Im(f) = \mathbb{R}$

x	$f(x)$
1	$\log_{\frac{1}{2}} 1 = 0$
2	$\log_{\frac{1}{2}} 2 = -1$
4	$\log_{\frac{1}{2}} 4 = -2$
8	$\log_{\frac{1}{2}} 8 = -3$
$\frac{1}{2}$	$\log_{\frac{1}{2}} \frac{1}{2} = 1$



$\frac{1}{2}$ | $\log_{\frac{1}{2}}\frac{1}{2} = 1$

$\log_2(x)$ → positivo

$D(f) = \mathbb{R}_*^+$

$\log_2(x+1)$ → $x+1>0$ $\quad x>-1$

$D(f) = \{x \in \mathbb{R} \mid x > -1\}$