$$\left(\sqrt[6]{4}\right)^{-3}-\left(\frac{5}{\sqrt{5}}\right)^{2}=\left(\sqrt[6]{2^2}\right)^{-3}-\left(\frac{5}{5^{1/2}}\right)^{2}=\left[\left(2^2\right)^{1/6}\right]^{-3}-\frac{5^2}{\left(5^{1/2}\right)^2}$$

$$=2^{2\cdot\frac{1}{6}\cdot(-3)}-\frac{25}{5^{1/2\cdot 2}}=2^{-1}-\frac{25}{5}=\frac{1}{2}-5=\frac{1-10}{2}=-\frac{9}{2}$$

Logaritmos

$$2^x=2^5 \Rightarrow x=5$$

$$2^x=3 \Rightarrow x=\log_2 3$$

$$\boxed{\log_a x=y \iff a^y=x}$$

- $\log_a 1=y \iff a^y=1 \Rightarrow y=0 \quad \therefore \boxed{\log_a 1=0}$
- $\log_a(a^x)=y \iff a^y=a^x \Rightarrow y=x \quad \therefore \boxed{\log_a(a^x)=x}$

$\log_4(4^2)=2$, $\log_5(5^{14})=14$, $\log_{\sqrt{2}}(\sqrt{2}^{\pi})=\pi$

- $a^{\log_a x}=a^y=x \quad \therefore \boxed{a^{\log_a x}=x}$

$3^{\log_3 5}=5$, $6^{\log_6 4}=4$, $\pi^{\log_\pi\left(\frac{3}{7}\right)}=\frac{3}{7}$

- $\log_a(xy) = \log_a x + \log_a y$ $\quad (a^m \cdot a^n = a^{m+n})$

$$\log_6(8 \cdot 7) = \log_6 8 + \log_6 7$$
$$\log_6(8\cdot 7) = \log_6 56$$

- $\log_a\left(\frac{x}{y}\right) = \log_a x - \log_a y$

$$\log_{13}\left(\frac{22}{57}\right) = \log_{13} 22 - \log_{13} 57$$

- $\log_a(x^y) = y \cdot \log_a x$

$$\log_{15}(18^{69}) = 69 \cdot \log_{15} 18$$

- $\log_y x = \dfrac{\log_a x}{\log_a y}$

$$\log_2 9 = \frac{\log_4 9}{\log_4 2}$$

Exercício: $\log_3\left[\log_3\left(\sqrt[3]{\sqrt[3]{\sqrt[3]{3}}}\right)\right]$

$$\sqrt[3]{3} = 3^{\frac{1}{3}}$$

$$\sqrt[3]{\sqrt[3]{3}} = \sqrt[3]{3^{1/3}} = \left(3^{1/3}\right)^{1/3} = 3^{\frac{1}{9}}$$

$$\sqrt[3]{\sqrt[3]{\sqrt[3]{3}}} = \sqrt[3]{3^{1/9}} = \left(3^{1/9}\right)^{1/3} = 3^{1/27}$$

$$\log_3\left[\log_3\left(\sqrt[3]{\sqrt[3]{\sqrt[3]{3}}}\right)\right] = \log_3\left[\log_3\left(3^{1/27}\right)\right]$$

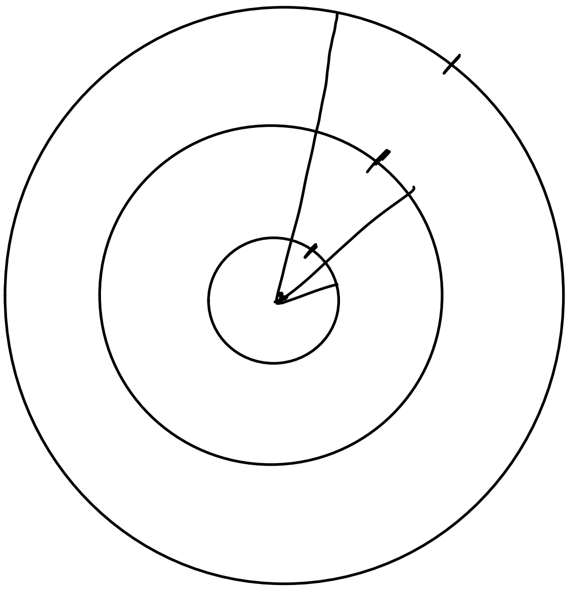
$$= \log_3\left[\frac{1}{27}\right] = \log_3 1 - \log_3 27$$

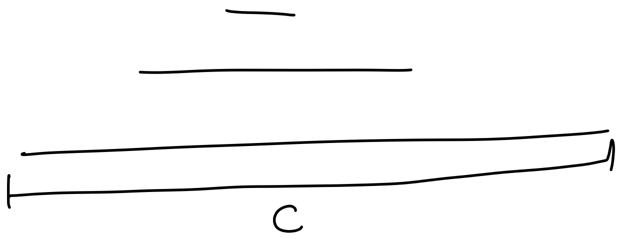
$$= -\log_3 27 = -\log_3(3^3) = -3.$$

$\ln x = \log_e x$, $e \approx 2{,}718281828459045$

log. natural

Eulr





$\frac{C}{2r}$ = constante $= \pi$