

Calcular la longitud del arco de curva $y = \ln \frac{e^x - 1}{e^x + 1}$ comprendido entre los puntos de abscisa 2 y 4.

SOLUCIÓN

$$\text{longitud} = \int_a^b \sqrt{1 + y'^2} dx$$

$$y = \ln \frac{e^x - 1}{e^x + 1} \Rightarrow y' = \frac{2e^x}{e^{2x} - 1}$$

No se indican las simplificaciones

$$l = \int_2^4 \sqrt{1 + \left(\frac{2e^x}{e^{2x} - 1}\right)^2} dx = \int_2^4 \frac{e^{2x} + 1}{e^{2x} - 1} dx = (e^{2x} = t)$$

$$\int_{e^2}^{e^4} \frac{t+1}{t(t-1)} dt = (\text{racional}) = -\frac{1}{2} \int_{e^2}^{e^4} \frac{1}{t} dt + \int_{e^2}^{e^4} \frac{1}{t-1} dt =$$

$$= -2 + \ln(e^4 + 1) \cong 2'01815 \text{ unidades}$$

Resuelto en www.wolframalpha.com



int_2^4 sqrt(1+((log((e^x-1)/(e^x+1))))^2) dx

Assuming "log" is the natural logarithm | Use the base 10 logarithm instead

Definite integral:

More digits

$$\int_2^4 \sqrt{1 + \left(\frac{\partial}{\partial x} \log\left(\frac{e^x - 1}{e^x + 1}\right)\right)^2} dx =$$

$$-2 - \log(-1 + e^4) + \log(-1 + e^8) \approx 2.01815...$$

log(x) is the natural logarithm >