$$= \underbrace{\lim_{t\to+\infty} \left(\ln \left| \frac{\sqrt{t^2+4}+t}{(t+2)^c} \right| + \ln(2^{c-1}) \right)}_{} = r$$

Para esse limite existir temos que deve existir o limite:

$$\lim_{t\to+\infty} \frac{\sqrt{t^2+4}+t}{(t+2)} = L > 0$$

$$L = \lim_{t\to+\infty} \frac{\sqrt{t^2+4}+t}{(t+2)^c} \underset{\frac{\infty}{\infty}}{=} \lim_{t\to\infty} \frac{\frac{1}{\cancel{2}\sqrt{t^2+4}}(\cancel{2}t)+1}{c(t+2)^{c-1}(1)}$$

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$$= \lim_{t\to+\infty} \left(\frac{\frac{t}{\sqrt{t^2\left(1+\frac{4}{t^2}\right)}}+1}{c(t+2)^{c-1}} \right) = \lim_{t\to+\infty} \left(\frac{\frac{1}{\sqrt{1+\frac{4}{\underset{0}{t^2}}}}+1}{c(t+2)^{c-1}} \right)$$

$$= \frac{2}{\lim_{t\to+\infty}(c(t+2)^{c-1})} = L$$

$$= \frac{2}{L}$$

• $c < 1 \Rightarrow \lim_{t\to+\infty} (t+2)^{c-1} = \lim_{t\to\infty} \frac{1}{(t+2)^{1-c}} = 0$

$(c-1<0)$ $\quad 1-c>0$

$$\Rightarrow h = \frac{2}{c \cdot \lim\limits_{t \to +\infty} (t+2)^{c-1}} = \text{"}\frac{2}{0}\text{"} = +\infty$$

- $c = 1 \Rightarrow \lim\limits_{t \to +\infty} (t+2)^{c-1} = \lim\limits_{t \to +\infty} (t+2)^{0} = \lim\limits_{t \to +\infty} 1 = 1$

$$\Rightarrow h = \frac{2}{1 \cdot \lim\limits_{t \to +\infty} 1} = 2$$

- $c > 1 \Rightarrow \lim\limits_{t \to +\infty} (t+2)^{c-1} = +\infty$

$(c-1 > 0)$

$$\Rightarrow h = \frac{2}{c \lim\limits_{t \to +\infty} (t+2)^{c-1}} = \text{"}\frac{2}{\infty}\text{"} = 0$$

$$I = \lim_{t \to +\infty} \left(\left| \frac{\sqrt{t^2+4} + t}{(t+2)} \right| + \ln(2^{c-1}) \right)$$

- $c < 1 \Rightarrow h = +\infty \Rightarrow I$ diverge, pois $\lim\limits_{x \to \infty} (\ln x) = +\infty$
- $c = 1 \Rightarrow h = 2 \Rightarrow I = \ln 2 + \ln(2^{1-1}) = \ln(2) + \ln 1 = \ln 2$
- $c > 1 \Rightarrow h = 0 \Rightarrow I$ diverge, pois $\lim\limits_{x \to 0^+} (\ln x) = -\infty$