BY GIMUSI 23/06/16

$$\begin{cases} u' = u \log^3 u \\ u(0) = \alpha \end{cases}$$

$$\frac{du}{d\delta} = u \log^3 u \qquad \frac{du}{u \log^3 u} = d\delta \qquad -\frac{1}{2}\,\frac{1}{\log^2 u} = \delta + c$$

$$\log^2 u = \frac{1}{c - 2\delta} \qquad \log u = \pm\sqrt{\frac{1}{c-2\delta}} \qquad u = e^{\pm\sqrt{\frac{1}{c-2\delta}}}$$

$$u(0) = \alpha \quad \log^2\alpha = 1/c \ \rightsquigarrow\ u = e^{\pm\sqrt{\frac{\log^2\alpha}{1-2\delta\log^2\alpha}}} = e^{\frac{\log\alpha}{\sqrt{1-2\delta\log^2\alpha}}}$$

SOLUZIONE GENERALE

OSS $\delta = 0 \quad u(0) = e^{\log\alpha}$ $\begin{cases} \alpha \neq 1 & u(0) = e^{\log\alpha} = \alpha \\ \alpha = 1 & u(0) = e^0 = 1 \end{cases}$

$\underline{\alpha = 1}$ $\quad u = e^0 = 1 \quad$ OK $\ (u' = 1 \cdot \log^3 1 = 0)$ SOGLIA

$\underline{\alpha \neq 1}$ $\quad 1 - 2\delta\log^2\alpha > 0 \quad \delta < \dfrac{1}{2\log^2\alpha} = \delta_\alpha$ TEMPO DI VITA

$$\begin{cases} \underline{\alpha > 1} & \log\alpha > 0 & \lim\limits_{\delta \to \delta_\alpha^-} u = +\infty \\ \underline{0 < \alpha < 1} & \log\alpha < 0 & \lim\limits_{\delta \to \delta_\alpha^-} u = 0 \end{cases}$$

BLOW UP

BREAK DOWN