

①

$$y' = \frac{y^2}{3x+1}$$

$$x \neq -\frac{1}{3}$$

$y=0$ soluzione stazionaria

$$\frac{y'}{y^2} = \frac{1}{3x+1}$$

$$\int \frac{dy}{y^2} = \int \frac{dx}{3x+1}$$

$$-\frac{1}{y} = \frac{1}{3} \lg|3x+1| + c$$

$$\frac{1}{y} = -\frac{1}{3} \lg|3x+1| - c$$

$$y = -\frac{1}{\frac{1}{3} \lg|3x+1| + c}$$

Pb. di Cauchy

$$y(-\frac{2}{3}) = 1$$

$$1 = -\frac{1}{\frac{1}{3} \lg|-2+1| + c} \Rightarrow 1 = -\frac{1}{c} \quad c = -1$$

$$y(x) = -\frac{1}{\frac{1}{3} \lg|3x+1| - 1}$$

$$\begin{aligned} \lg|3x+1| &\neq \frac{3}{3} \\ \Rightarrow |3x+1| &\neq e^3 \quad 3x+1 \neq \pm e^3 \\ x &\neq \frac{-1+e^3}{3} \quad x \neq -\frac{1+e^3}{3} \end{aligned}$$

La soluzione è definita per

$$x \in \left(-\frac{1+e^3}{3}, -\frac{1}{3}\right)$$

