SCHEMA SOL. ESAME 16.9.2014 1 PARTE

Es. 1 $\begin{cases} y' = y^3 \cos 2x \\ y(\pi/4) = \sqrt{2} \end{cases}$ Sol. stazionarie $y = 0$

$y \neq 0$

$$\frac{y'}{y^3} = \cos(2x) \qquad \int \frac{dy}{y^3} = \int \cos 2x \, dx$$

$$-\frac{1}{2y^2} = \frac{1}{2}\operatorname{sen} 2x + c \qquad \frac{1}{y^2} = -(\operatorname{sen} 2x + c)$$

$$y^2 = -\frac{1}{\operatorname{sen} 2x + c} \qquad y = \pm\sqrt{-\frac{1}{\operatorname{sen} 2x + c}} \qquad -(\operatorname{sen} 2x + c) > 0$$

$$\operatorname{sen} 2x + c < 0$$

$$y(\pi/4) = \sqrt{-\frac{1}{1+c}} = \sqrt{2}$$

$$-\frac{1}{1+c} = 2 \qquad -1 = (1+c)2 \Rightarrow -1 = 2 + 2c$$

$$c = -\frac{3}{2}$$

La sol. è

$$y(x) = \sqrt{-\frac{1}{\operatorname{sen} 2x - 3/2}} = \sqrt{\frac{1}{3/2 - \operatorname{sen} 2x}} \qquad x \in \mathbb{R}$$

$\operatorname{sen} 2x - 3/2 < 0 \quad \operatorname{sen} 2x < 3/2$ sempre perché $\frac{3}{2} > 1$.