

$$(1) \quad F(t, y(t), y'(t)) = 0$$

$$F: \mathbb{R}^3 \rightarrow \mathbb{R}$$

$$(2) \quad y' = f(t, y(t))$$

$$f: \mathbb{R}^2 \rightarrow \mathbb{R}.$$

$$F(\alpha, \beta, \gamma) = \alpha + \beta + \gamma$$

$$t + y(t) + y'(t) = 0$$

$$y'(t) = -t - y(t)$$

$$y'(t) = f(t, y(t))$$

$$f(\alpha, \beta) = -\alpha - \beta.$$

$$F(t, y, y') = 0 \quad y' = f(t, y)$$

$$y'' = y - y'.$$

$$F(t, y, y') = 0 \quad \varphi: \mathbb{R} \rightarrow \mathbb{R} \quad D\varphi = J$$

$$\forall t \in J: F(t, \varphi(t), \varphi'(t)) = 0 \quad \Rightarrow$$

φ je řešením na J .

Př. $\varphi(t) = 1 - t$ je na $J = (-\infty, \infty)$ řešením

OBR tvaru $t + y + y' = 0$.

$$\forall t \in (-\infty, \infty);$$

$$t + \varphi(t) + \varphi'(t) = t + (1-t) + (-1) = 0.$$

$$\varphi(t) = e^{-t} + (1-t)$$

$$\forall t \in (-\infty, \infty);$$

$$\begin{aligned} t + \varphi(t) + \varphi'(t) &= t + e^{-t} + (1-t) + (-e^{-t} - 1) = \\ &= 0. \end{aligned}$$

$$t + \gamma + \gamma' = 0$$

$$\gamma(t) = C \cdot e^{-t} + (1-t), \quad C \in \mathbb{R}.$$

$$|\gamma'|^2 + 1 = 0 \quad \forall t \in J: (\varphi'(t))^2 = -1.$$

$$\underline{F(t, \gamma, \gamma') = 0}$$

$$\underline{\gamma(t_0) = \gamma_0.}$$

Cauchyova úloha

$$t + \gamma + \gamma' = 0, \quad \gamma(0) = 2$$

$$\varphi(t) = e^{-t} + (1-t), \quad \varphi(0) = 2.$$

$$F(t, \gamma, \gamma') = 0$$

$$\begin{array}{l} \varphi_1 \text{ na } J_1 \\ \varphi \text{ na } J \end{array}$$

$$J_1 \subset J, \quad J_1 \neq J$$

$$\forall t \in J_1: \varphi_1(t) = \varphi(t) \quad \varphi \text{ je prodloužením } \varphi_1 \text{ na } J$$