

$$F: \mathbb{R}^{n+2} \rightarrow \mathbb{R} \quad F(t, y(t), y'(t), \dots, y^{(n)}(t)) = 0$$

$$(1) \quad F(t, y, y', \dots, y^{(n)}) = 0$$

$$(2) \quad y^{(n)} = f(t, y, \dots, y^{(n-1)}), \quad f: \mathbb{R}^{n+1} \rightarrow \mathbb{R}.$$

φ je rešením (1) na $J \Leftrightarrow$

$$\forall t \in J: F(t, \varphi(t), \varphi'(t), \dots, \varphi^{(n)}(t)) = 0, \quad D\varphi = J.$$

$$(t_0, y_0, \dots, y_{n-1}) \in \mathbb{R}^n$$

$$(3) \quad y(t_0) = y_0, \quad y'(t_0) = y_1, \dots, \quad y^{(n-1)}(t_0) = y_{n-1}$$

(1), (3) ... Cauchyova úloha

př. $y'' = e^t, \quad y(0) = 0, \quad y'(0) = 1$

$$\forall t \in (-\infty, \infty): \quad y''(t) = e^t \quad \Rightarrow \quad \exists C_1 \in \mathbb{R}$$

$$y'(t) = e^t + C_1 \quad \Rightarrow \quad \exists C_2 \in \mathbb{R}$$

$$y(t) = e^t + C_1 t + C_2.$$

$$y(0) = 0: \quad 0 = 1 + C_2 \quad C_1 = 0$$

$$y'(0) = 1: \quad 1 = 1 + C_1 \quad C_2 = -1$$

$$\varphi(t) = e^t - 1.$$

př. $y'' = y', \quad z = y' \quad z' = z \quad z(t) = C_1 \cdot e^t, \quad C_1 \in \mathbb{R}$

$$y'(t) = C_1 \cdot e^t, \quad y(t) = C_1 \cdot e^t + C_2, \quad C_1 \in \mathbb{R} \neq C_2.$$