$f_1 : \mathbb{R}^{1+n} \to \mathbb{R},\ f_2 : \mathbb{R}^{1+n} \to \mathbb{R}, \dots, f_n : \mathbb{R}^{1+n} \to \mathbb{R}$

$f : \mathbb{R}^{1+n} \to \mathbb{R}^n, \quad f = (f_1, f_2, \dots, f_n)$

(1) $y' = f(t, y) \quad , \quad y = (y_1, \dots, y_n) : \mathbb{R} \to \mathbb{R}^n.$

$y_1' = f_1(t, y_1, \dots, y_n)$

$y_2' = f_2(t, y_1, \dots, y_n)$

$\dots$

$y_n' = f_n(t, y_1, \dots, y_n)$

$(t_0, y_0) = (t_0, y_{01}, y_{02}, \dots, y_{0n}) \in \mathbb{R}^{1+n}$

(2) $y_1(t_0) = y_{01}, \dots, y_n(t_0) = y_{0n} \qquad y(t_0) = y_0$

(1), (2) ... Cauchyova úloha

Př. $y_1' = y_1 \quad , \quad f_1(\alpha, \beta, \gamma) = \beta$

$y_2' = y_1 + t \quad , \quad f_2(\alpha, \beta, \gamma) = \beta + \alpha.$

$y(0) = (1, 2).$

$y_1' = y_1 \ \dots \ y_1(t) = C_1 \cdot e^t, \quad C_1 \in \mathbb{R}$

$y_2' = C_1 \cdot e^t + t \quad , \quad y_2(t) = C_1 e^t + \frac{1}{2} t^2 + C_2$

$y_1(0) = 1 \ \dots \ 1 = C_1 \cdot e^0 \qquad C_1 = 1$

$y_2(0) = 2 \ \dots \ 2 = C_1 \cdot e^0 + \frac{1}{2} 0^2 + C_2 \qquad C_2 = 1$

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