$$\underline{x_{n+1}} = F(n, \underline{\underline{x_n}}) \quad \leftarrow \text{diferenční rovnice 1. řádu}$$

$$x_{n+1} - x_n = ?$$

$$y(x) \qquad \boxed{y'(x) = F(x, y(x))}$$

$$(e^x)' = e^x$$

10 17-14:07

$$\underbrace{\boxed{y'(x) = r \cdot y(x)} + f(x)}_{\text{1 řešení + přičtení homogenního}}$$

$$(y'(x))^2 - y^2 = 0$$

$$y' = y \quad \text{nebo} \quad y' = -y$$

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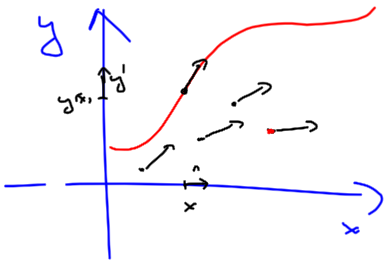

$$y'(x) = f(x, y(x))$$

$$(x'(t), y'(t)) = (t', y'(t)) = (1, f(x, y(x)))$$

$$(f'(t), g'(t)) \quad \forall (x_0, y_0)$$

$$x'(t) = f(\cancel{t}, x(t), y(t))$$

$$y'(t) = g(\cancel{t}, x(t), y(t))$$

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$$y \overset{L}{\longmapsto} L(y)$$

$$\{\text{dif. funkce}\} \xrightarrow{L} \{\text{dif. fce}\}$$

$$y(x) = y_0 + \int_{x_0}^{x} \underline{g(x)}\,dx \iff g(x) = y'(x)$$

$y(x), z(x)$ funkce

$$|(L(y) - L(z))(x)| = \left| \int_{x_0}^{x} f(x, y(x))\,dx - \int_{x_0}^{x} f(x, z(x))\,dx \right|$$

$$\le \int_{x_0}^{x} | f(x, y(x)) - f(x, z(x))|\,dx \le C \int_{x_0}^{x} |y(x) - z(x)|\,dx$$

$$\le D|x - x_0| \quad \text{pro dostatečně malé okolí bodu } x_0$$

$$\Rightarrow \boxed{\sup |L(y)(x) - L(z)(x)| < \sup |y(x) - z(x)|}$$

10 17-14:46

$$dy = f(x) \cdot g(y)\,dx \qquad y' = \frac{dy}{dx}$$

$$\frac{1}{g(y)}\,dy = f(x)\,dx \qquad dy = f(x, y(x))\,dx$$

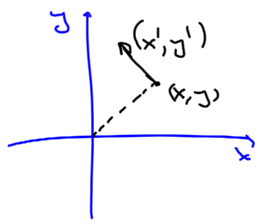
$$\int \frac{1}{y}\,dy = \ln|y(x)| = \frac{1}{2}x^2 + C$$

$$\Rightarrow |y(x)| = e^{\frac{1}{2}x^2 + C} = e^{\frac{1}{2}x^2} \cdot \underline{e^C}$$

$$y(x) = D \cdot e^{\frac{1}{2}x^2} \qquad D \in \mathbb{R}$$

10 17-15:02

$$\frac{\partial f}{\partial t} = \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} + \frac{\partial^2 f}{\partial z^2}$$



10 17-15:16

$$\boxed{y^{(k)}(x) = F(\overset{x}{x}, \overset{z_1}{y}, \overset{z_2}{y'}, \dots, \overset{z_{k-1}}{y^{(k-1)}})}$$

$z_1 = y,\ z_2 = y',\ \dots,\ z_{k-1} = y^{(k-1)}$:

$$\boxed{\begin{aligned} z_1' &= z_2 \\ z_2' &= z_3 \\ &\vdots \\ z_{k-1}' &= F(x, z_1, z_2, \dots, z_{k-1}) \end{aligned}}$$

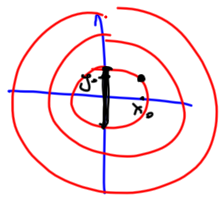
$\boxed{y'' = -y}$

10 17-15:27

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

$y' = x$

$x' = y'' = -y$



$y'' + y = 0 \qquad e^{\lambda x}$

$(\lambda^2 + 1) e^{\lambda x} = 0 \Rightarrow \lambda^2 = -1,\ \lambda = \pm i$

$e^{\pm ix}$

$\lambda^2 + \alpha\lambda + 1 = 0 \Rightarrow$

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