$y' + p(x)y = q(x)$ $\qquad p, q : (a,b) \to \mathbb{R}$

Spoj.

$y' - \frac{y}{x} = x$ $\qquad p(x) = -\frac{1}{x} \qquad q(x) = x$

$y(1) = 3$

$x \in (-\infty, 0), \quad (0, \infty)$

- $y' + p(x)y = 0 \longleftarrow$ homog.

$y' - y/x = 0$ $\qquad y \equiv 0$

$y'/y = 1/x$

$\int \frac{1}{y} dy = \int \frac{1}{x} dx$

$\ln|y| = \ln|x| + c$

$|y| = e^{\ln|x| + c}$

$|y| = e^{c} \cdot |x|$

$y = k \cdot x \qquad k \in \mathbb{R} \setminus \{0\}$

$y_H = k \cdot x \qquad k \in \mathbb{R} \qquad x \in (-\infty, 0)$
$(0, \infty)$

- variace konstant

$y' - y/x = x \qquad y_p = k(x) \cdot x$

$y_p' = k'(x) \cdot x + k(x) \cdot 1$

$k'(x) \cdot x + \cancel{k(x)} - \cancel{\frac{k(x) \cdot x}{x}} = x$

$k'(x) \cdot x = x$

$k'(x) = 1$

$\boxed{k(x) = x + d}$

$y = k(x) \cdot x \qquad y = (x + d) \cdot x$

$= \underbrace{d \cdot x}_{y_H} + \underbrace{x^2}_{y_P} \longrightarrow$ řeší PS

řeší rovn. O

$x \in (-\infty, 0) \qquad x \in (0, \infty)$

$y(1) = 3$ (x = 1)

$dx + x^2$ (x = 1)

$d \cdot 1 + 1 = 3$

$d = 2$

$y = (x+2) \cdot x \qquad x \in (0, \infty)$

$y' + p(x) y = q(x)$ (a,b)

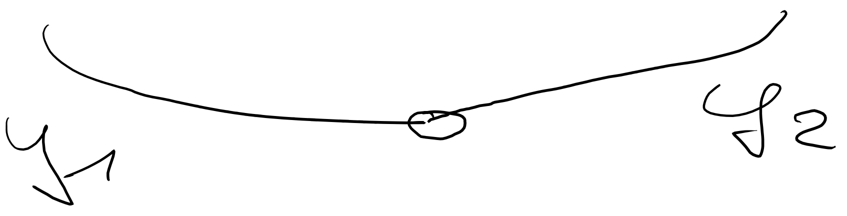
$x y' - y = x^2$ $x \in \mathbb{R}$

$y' - y/x = x$ $x \neq 0$

$y_1 = (x + d_1) x$ $y_2 = (x + d_2) x$

$x \in (-\infty, 0)$ $x \in (0, \infty)$

~ 0



(1) $\lim\limits_{x \to 0-} y_1 = \lim\limits_{y \to 0+} y_2$

$\lim\limits_{x \to 0-} (x + d_1) x = \underline{\underline{0}} = \lim\limits_{x \to 0+} (x + d_2) x$

(2) $y'(0)$ $y'_-(0)$ $y'_+(0)$

$y_1' = \underline{2x + d_1}$ $y_2' = 2x + d_2$

$y'_-(0) = \lim\limits_{x \to 0-} 2x + d_1$ $y'_+(0) = \lim\limits_{x \to 0+} 2x + d_2$

$= d_1$ $=$ $= d_2$

$d_1 = d_2$

Wyso.

$$y = \begin{cases} (x + d_1) x & x < 0 \\ 0 & x = 0 \\ (x + d_1) x & x > 0 \end{cases}$$

$\underline{\underline{y = (x + d_1) x}}$ $x \in \mathbb{R}$

$y(1) = 3$ $(x + d_1) x$

$(1 + d_1) 1 = 3$ $d_1 = 2$

$\boxed{y = (x + 2) x}$

$$\int \cot x = \int \frac{\cos x}{\sin x}\, dx = \int \frac{1}{y}\, dy$$

$$y = \sin x$$

$$dy = \cos x\, dx$$