BONUS 3 - řešení

(1) AUTONOMNÍ ROVNICE:

$$y' = y^2 + 1$$

$$\frac{dx}{dt} = x^2 + \sqrt{x}$$

$$\frac{dy}{dt} = y^2 + 5y + 1$$

(2) $x' = y^2 - x^2$
$y' = x - 1$

$y^2 - x^2 = 0$
$x - 1 = 0 \Rightarrow \underline{x = 1} \Rightarrow y^2 = 1 \Rightarrow \underline{y = \pm 1}$

$\Rightarrow \underline{[1,1]}, \underline{[1,-1]}$

$$J = \begin{pmatrix} -2x & 2y \\ 1 & 0 \end{pmatrix}$$

$\underline{[1,1]}$:
$$J = \begin{pmatrix} -2 & 2 \\ 1 & 0 \end{pmatrix} \Rightarrow \begin{vmatrix} -2-\lambda & 2 \\ 1 & -\lambda \end{vmatrix} = \lambda^2 + 2\lambda - 2 = 0$$

$$\lambda_{1,2} = \frac{-2 \pm \sqrt{4+8}}{2} = \frac{-2 \pm 2\sqrt{3}}{2} = \underline{-1 \pm \sqrt{3}} \gtrless 0$$

$\Rightarrow$ SEDLO

$\underline{[1,-1]}$:
$$J = \begin{pmatrix} -2 & -2 \\ 1 & 0 \end{pmatrix} \Rightarrow \begin{vmatrix} -2-\lambda & -2 \\ 1 & -\lambda \end{vmatrix} = \lambda^2 + 2\lambda + 2 = 0$$

$$\lambda_{1,2} = \frac{-2 \pm \sqrt{4-8}}{2} = \frac{-2 \pm 2i}{2} = \underline{-1 \pm i} \Rightarrow$$

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