1. zh. megoldások

① $y' = \frac{y}{y^2-1} \cdot \frac{x^2-1}{x}$ 2p $\int \frac{y^2-1}{y}\,dy = \int \frac{x^2-1}{x}\,dx \Rightarrow y = x$ 2p

② $y' - \frac{1}{x}y = x^2 e^{x^2}$ $\quad y_h(x) = Cx \quad y_p(x) = C(x)\cdot x$ 1p

$\Rightarrow \quad C(x) = \frac{1}{2}e^{x^2} \quad y_p(x) = \frac{1}{2}xe^{x^2}$ 2p

$\Rightarrow \quad y(x) = \left(1 - \frac{e}{2}\right)x + \frac{1}{2}xe^{x^2}$ 1p

③ $y_h(x) = e^{\lambda x} \Rightarrow \lambda^2 - 1 = 0 \quad \lambda_{12} = \pm 1 \quad y_h(x) = c_1 e^x + c_2 e^{-x}$ 1p

$\{e^x\}, \{x, 1\} \rightsquigarrow \{xe^x\}, \{x, 1\}$

$y_p(x) = Axe^x + Bx + C \quad \Rightarrow \quad y_p(x) = xe^x + x$ 2p

$y_{ált}(x) = c_1 e^x + c_2 e^{-x} + xe^x + x$ 1p

④ $\lambda_{12} = 0 \quad \lambda_3 = 1 \qquad e^{\lambda t} = h_2(t)\lambda^2 + h_1(t)\lambda + h_0(t)$

$h_0(t) = 1,\ h_1(t) = t,\ h_2(t) = e^t - t - 1$ 2p $\quad \underline{\underline{A}}^2 = \begin{pmatrix} 0 & 0 & -1 \\ 0 & 0 & 2 \\ 0 & 0 & 1 \end{pmatrix}$

$e^{\underline{\underline{A}}t} = (e^t - t - 1)\underline{\underline{A}}^2 + t\underline{\underline{A}} + \underline{\underline{E}} = \begin{pmatrix} 1 & -t & -e^t+2t+1 \\ 0 & 1 & 2(e^t-1) \\ 0 & 0 & e^t \end{pmatrix}$ 2p

$\underline{x}(t) = e^{\underline{\underline{A}}t} \cdot \underline{c}$

⑤ Egzakt de $\quad (y^3 + 2xy)\,dx + (3xy^2 + x^2)\,dy = 0$ 3p

<u>mo</u>: $\quad F(x,y) = xy^3 + x^2y = C \qquad C = 2$ 1p