+ SOLVE of ODE'S

Wednesday, May 29, 2024 9:18 AM

$$x^{(4)} - 7x^{(3)} + 4x^{(2)} + 5x^{(1)} - 2x = 0$$

$$x^{(4)} = +2x - 5x^{(1)} - 4x^{(2)} + 7x^{(3)}$$

$x = v_1$ $\quad x^{(1)} = v_2$ $\quad x^{(2)} = v_3$ $\quad x^{(3)} = v_4$ $\quad x^{(4)} = v_5$

$$x^{(4)} = +2v_1 - 5v_2 - 4v_3 + 7v_4 = v_4'$$

$x = v_1$ $\quad x' = v_2 = v_1'$ $\quad x^2 = v_3 = v_2'$ $\quad x^3 = v_4 = v_3'$ $\quad x^4 = v_5 = v_4'$

$$v_1' = \quad - v_2$$

$$v_2' = \quad -v_3$$

$$v_3' = \quad v_4$$

$$v_4' = 2v_1 - 5v_2 - 4v_3 + 7x_4$$

$$y'' + 4y = 0$$

$$y'' = -4y$$

$Y = v_1$

$y' = v_2 = v_1'$

$y'' = v_3 = v_2'$

$y''' = v_4 = v_3'$

$$\begin{bmatrix} v_1' \\ v_2' \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -4 & 0 \end{bmatrix} \begin{bmatrix} v_1 \\ v_2 \end{bmatrix}$$

$$v_2' = -4v_1 + 0v_2$$

... vi sagde : vores omskrivingen

$V_2' = -4v_1 + 0v_2$

$V_1' = 0v_1 + 1_2$ → som vi sagde : vores omskrivningen

$$Ay''' + By'' + Cy' + Dy = 0$$

$$\begin{bmatrix} V_1' \\ V_2' \\ V_3' \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -\frac{D}{A} & -\frac{C}{A} & \frac{B}{A} \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \\ V_3 \end{bmatrix}$$

$$\boxed{\begin{aligned} y &= V_1 \\ y' &= V_2 = V_1' \\ y'' &= V_3 = V_2' \\ y''' &= V_4 = V_3' \end{aligned}}$$

So this is the basis way to do it

$$\boxed{\bar{y} = C_1 \bar{V}_1 e^{\lambda_1 t} + C_2 \bar{V}_2 e^{\lambda_2 t} + C_3 \bar{V}_3 e^{\lambda_3 t} \ldots\ldots}$$

Basis formen husk den nu forfanen!