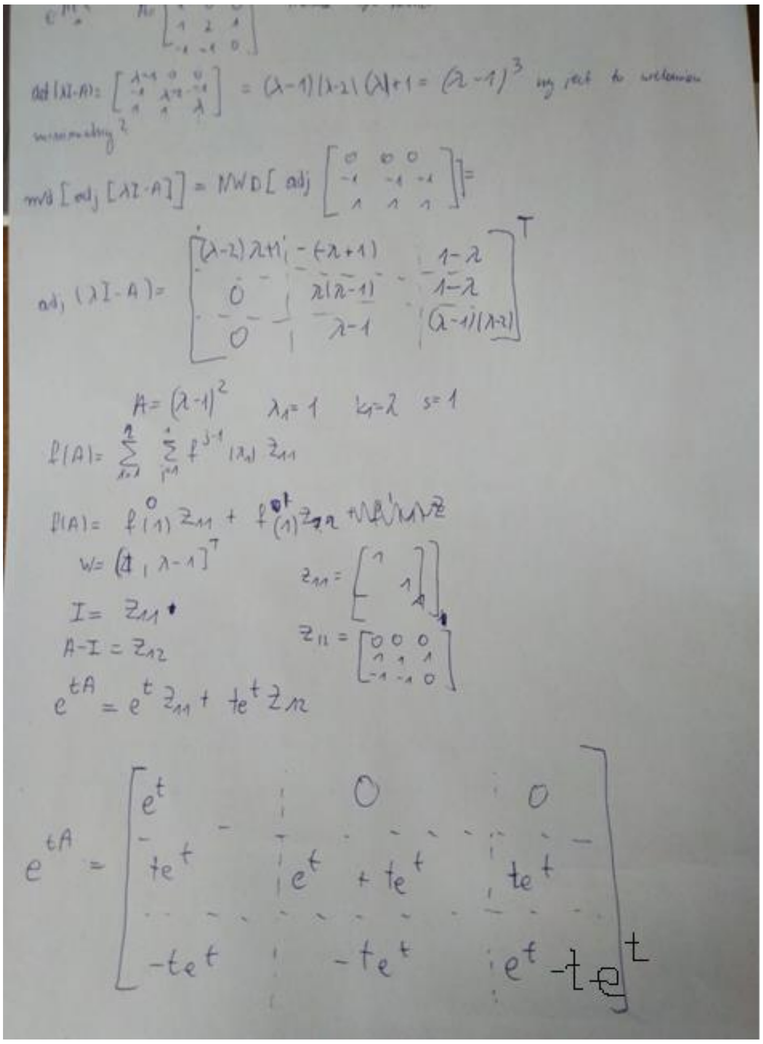
E^(At) = ?

1	0	0
1	2	1
-1	-1	0



$$A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{bmatrix}$$

$$\det(\lambda I - A) = \begin{bmatrix} \lambda-1 & 0 & 0 \\ -1 & \lambda-2 & -1 \\ 1 & 1 & \lambda \end{bmatrix} = (\lambda-1)(\lambda-2)(\lambda)+1 = (\lambda-1)^3$$

$$\text{nwd}[\text{adj}[\lambda I - A]] = \text{NWD}\left[\text{adj}\begin{bmatrix} 0 & 0 & 0 \\ -1 & -1 & -1 \\ 1 & 1 & 1 \end{bmatrix}\right] =$$

$$\text{adj}(\lambda I - A) = \begin{bmatrix} (\lambda-2)\lambda+1 & -(-\lambda+1) & 1-\lambda \\ 0 & \lambda(\lambda-1) & 1-\lambda \\ 0 & \lambda-1 & (\lambda-1)(\lambda-2) \end{bmatrix}^T$$

$$A = (\lambda-1)^2 \quad \lambda_1 = 1 \quad k_1 = 2 \quad s = 1$$

$$f(A) = \sum_{\lambda=1}^{2} \sum_{j=1} f^{j-1}(\lambda_1) Z_{11}$$

$$f(A) = f^{0}(1) Z_{11} + f^{1}(1) Z_{12}$$

$$w = [1, \lambda-1]^T \qquad Z_{11} = \begin{bmatrix} 1 & & \\ & 1 & \\ & & 1 \end{bmatrix}$$

$$I = Z_{11}$$

$$A - I = Z_{12} \qquad Z_{12} = \begin{bmatrix} 0 & 0 & 0 \\ 1 & 1 & 1 \\ -1 & -1 & 0 \end{bmatrix}$$

$$e^{tA} = e^t Z_{11} + te^t Z_{12}$$

$$e^{tA} = \begin{bmatrix} e^t & 0 & 0 \\ te^t & e^t + te^t & te^t \\ -te^t & -te^t & e^t - te^t \end{bmatrix}$$

$$e^{tA} = ?$$

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{bmatrix} \qquad \lambda I - A = \begin{bmatrix} \lambda-1 & 0 & 0 \\ -1 & \lambda-2 & -1 \\ 1 & 1 & \lambda \end{bmatrix}$$

$$\det(\lambda I - A) = (\lambda-1)(\lambda-2)(\lambda) + (\lambda-1) = (\lambda-1)^3$$

$$1\begin{bmatrix} 0 & 0 & 0 \\ -1 & -1 & -1 \\ 1 & 1 & 1 \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} \qquad \begin{aligned} x_1 &= -x_2 - x_3 \\ x_2 &= a \\ x_3 &= b \end{aligned} \qquad {}_1h_{11}^1 = \begin{bmatrix} -a-b \\ +a \\ +b \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 0 \\ -1 & -1 & -1 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} -a-b \\ a \\ b \end{bmatrix} =$$

$$0 = -a-b \Rightarrow b = -a$$

$$x_3 = b - x_2 - x_1$$

$$x_2 = c$$

$$x_3 = d$$

$$b = 1 \quad a = -1 \qquad {}_1h_1^2 = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} \qquad b = 0 \quad a = 1$$

$${}_1h_2^1 = \begin{bmatrix} -1 \\ 1 \\ 0 \end{bmatrix}$$

$${}_1h_1^1 = \begin{bmatrix} 0 \\ -1 \\ 1 \end{bmatrix} \qquad J = T^{-1} A^T$$

$$T = \underbrace{\begin{bmatrix} -1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 1 & 1 \end{bmatrix}}_{\text{te 2ro tacrone}} \qquad J = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & -1 \\ 0 & 0 & 1 \end{bmatrix} \qquad T^{-1} = \begin{bmatrix} -1 & 0 & 0 \\ -1 & -1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$$

$$J = [1] \oplus \begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix} \qquad e^{Jt} = \begin{bmatrix} e^t & 0 & 0 \\ 0 & e^t & -te^t \\ 0 & 0 & e^t \end{bmatrix}$$

$$e^{At} = \begin{bmatrix} -1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} e^t & 0 & 0 \\ 0 & e^t & -te^t \\ 0 & 0 & e^t \end{bmatrix} \begin{bmatrix} -1 & 0 & 0 \\ -1 & -1 & 0 \\ 1 & 1 & 1 \end{bmatrix} = \begin{bmatrix} e^t & 0 & 0 \\ te^t & te^t + e^t & te^t \\ -te^t & -te^t & e^t - te^t \end{bmatrix}$$