Norges teknisk–
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SIF5010 Matematikk 3 25.05.98

Fasit

Oppg 1

a) $y = e^x(C_1 \cos x + C_2 \sin x) + \frac{1}{10}(\cos x + 2\sin x)$

b) $y''' - 4y'' + 5y' - 2y = 0$

Oppg 2

a) Basis Row(A): $[1\ \ 0\ \ 10\ \ 2\ \ 0]^T$, $[0\ \ 1\ \ -5\ \ -1\ \ 10]^T$, $[0\ \ 0\ \ 0\ \ 0\ \ 1]^T$ (f.eks.)

Basis Col(A): $[1\ \ -2\ \ 0\ \ 0\ \ 3]^T$, $[2\ \ -5\ \ -3\ \ -2\ \ 6]^T$, $[2\ \ 6\ \ 18\ \ 8\ \ 6]^T$ (f.eks)

b) Basis Null(A): $[-10\ \ 5\ \ 1\ \ 0\ \ 0]^T$, $[-2\ \ 1\ \ 0\ \ 1\ \ 0]^T$ (f.eks)

c) $\text{Null}(A)^\perp = \text{Row}(A)$

d) Løsning kun for $\alpha = 3$

Oppg 3

a) $\lambda = 1$, $\mathbf{v} = a\begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} + b\begin{bmatrix} 0 \\ 1 \\ -1 \end{bmatrix}$, $(a,b) \neq (0,0)$; $\lambda = 4$, $\mathbf{v} = c\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$, $c \neq 0$

b) $S = \begin{bmatrix} 1 & 0 & 1 \\ -1 & 1 & 0 \\ 0 & -1 & 1 \end{bmatrix}$ (f.eks); $D = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 4 \end{bmatrix}$

c) $S = \frac{1}{\sqrt{6}}\begin{bmatrix} \sqrt{3} & 1 & \sqrt{2} \\ -\sqrt{3} & 1 & \sqrt{2} \\ 0 & -2 & \sqrt{2} \end{bmatrix}$ (f.eks)

d) $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = c_1 e^t \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} + c_2 e^t \begin{bmatrix} 0 \\ 1 \\ -1 \end{bmatrix} + c_3 e^{4t} \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$

e) $P^{-1} = \begin{bmatrix} -1 & 2 & 1 \\ 1 & -1 & 0 \\ 1 & -1 & -1 \end{bmatrix}$

f) Som 3 d)

Oppg 4

$$\begin{bmatrix} G_{n+1} \\ U_{n+1} \end{bmatrix} = \begin{bmatrix} 0.7 & 0.2 \\ 0.3 & 0.8 \end{bmatrix} \begin{bmatrix} G_n \\ U_n \end{bmatrix};$$

n	0	1	2	3
G_n	8000	6000	5000	4500
U_n	2000	4000	5000	5500