Norges teknisk–
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SIF5010 Matematikk 3 06.08.03

Fasit

Oppg 1 $-\frac{1}{2} - i\frac{\sqrt{3}}{2}$

Oppg 2

a) $y(\frac{3}{5}) \approx -1.6$

b) $y = -(x+1)$
$y(\frac{3}{5}) = -1.6$

Oppg 3

a) $y = -2 + e^{-3x} + 2x + e^{-x}$

b) $y = C_1 e^{2x} + C_2 x e^{2x} + \frac{x^2}{4}(2\ln x - 3)e^{2x}$

c) $y = C_1 e^{-x}\cos 2x + C_2 e^{-x}\sin 2x + 2\cos x + \sin x$

Oppg 4

a) $\det A = -(\alpha^2 - 1)^2$
$\alpha \neq \pm 1$

b) Uendelig mange løsnigner: $\alpha = 1$, Ingen løsning: $\alpha = -1$

Oppg 5

a) $\left\{ \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \\ 2 \\ 2 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 0 \\ -1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ -1 \\ 0 \end{bmatrix} \right\}$ $(f.eks.)$

b) $\left\{ \frac{1}{2}\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}, \frac{1}{\sqrt{12}}\begin{bmatrix} -3 \\ 1 \\ 1 \\ 1 \end{bmatrix} \right\}$ $(f.eks.)$

c) $\left\{ \begin{bmatrix} 0 \\ 1 \\ 0 \\ -1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ -1 \\ 0 \end{bmatrix} \right\}$ $(f.eks.)$

Oppg 7 **a)** $\lambda_1 = 0 : s \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, \quad s \neq 0,$

$\lambda_1 = -1 : s \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}, \quad s \neq 0,$

$\lambda_1 = -3 : s \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix}, \quad s \neq 0.$

b) $\mathbf{y} = C_1 e^{0t} \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} + C_2 e^{-t} \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix} + C_3 e^{-3t} \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix}$

c) $\mathbf{y} = 3 \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} + e^{-0.01t} \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix} + e^{-0.03t} \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix}$

$t \to \infty : \quad \mathbf{x} \to \begin{bmatrix} 3 \\ 3 \\ 3 \end{bmatrix}$