Norges teknisk–
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SIF5010 Matematikk 3 19.05.01

Fasit

Oppg 1 $z_k = e^{i(\frac{\pi}{2}+k\frac{2\pi}{3})}, \quad k = 0, 1, 2$

Oppg 2

a) $y = (2 - e^{-x})\cos x$

b) $y = 2e^x - 2x - 1$

c) $y = C_1 e^{-x} + C_2 x e^{-x} + x e^{-x} \ln x$

Oppg 3

a) $y = \frac{0.01}{k-0.25m}\left(\cos(0.5t) - \cos\left(\sqrt{\frac{k}{m}}t\right)\right)$

b) $k = 0.36$

Oppg 4

a) $\text{Null(A)} = \text{span}\{(-11, 4, 1, 0), (-11, 3, 0, 1)\}$ (f.eks)

$$\mathbf{x} = s\begin{bmatrix} -11 \\ 4 \\ 1 \\ 0 \end{bmatrix} + t\begin{bmatrix} -11 \\ 3 \\ 0 \\ 1 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \quad t, s \in \mathbb{R}$$

b) $\text{Col(A)} = \text{span}\{(1, 1, 2), (2, 5, 5)\}$ (f.eks)

$\text{Row(A)} = \text{span}\{(1, 0, 11, 4), (0, 1, -4, -3)\}$ (f.eks)

$\text{Row(A)}^{\perp} = \text{span}\{(-11, 4, 1, 0), (-11, 3, 0, 1)\}$ (f.eks)

Oppg 5

a) $\lambda = 1 \pm a$

To lineært uavhengige egenvektorer når $a \neq 0$.

b) $\underline{a \neq 0}: \mathbf{y} = C_1 e^{(1+a)t}\begin{bmatrix} 1 \\ a \end{bmatrix} + C_2 e^{(1-a)t}\begin{bmatrix} 1 \\ -a \end{bmatrix}$

$\underline{a = 0}: \mathbf{y} = C_1 e^t\begin{bmatrix} 1 \\ 0 \end{bmatrix} + C_2 e^t\left(t\begin{bmatrix} 1 \\ 0 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix}\right)$

Oppg 6

a) $P = \begin{bmatrix} \frac{1}{2} & -\frac{1}{2} & \frac{1}{2} & \frac{1}{2} \\ -\frac{1}{2} & \frac{1}{2} & \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} & -\frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} & \frac{1}{2} & -\frac{1}{2} \end{bmatrix}$

b) $M = \frac{1}{4}\begin{bmatrix} 6 & 4 & 0 & -2 \\ 4 & 6 & 2 & 0 \\ 0 & 2 & 6 & -4 \\ -2 & 0 & -4 & 6 \end{bmatrix}$ (f.eks)

Ja, det er 8 muligheter for M.