Norges teknisk–
naturvitenskapelige universitet
Institutt for matematiske fag

SIF5009 Matematikk 3 2.12.98

Fasit

Oppg 1

a) $y = c_1 e^x + c_2 e^{-2x} + xe^x + 2x + 1$

b) $y = c_1 e^x + c_2 \cos 2x + c_3 \sin 2x + \frac{1}{6}(\sin x - \cos x)$

c) $a = 2, \quad b = -1$

Oppg 2

a) $a - b + 2c = 0$

b) $x = r \begin{bmatrix} 2 \\ 1 \\ 0 \\ 0 \\ 0 \end{bmatrix} + s \begin{bmatrix} 1 \\ 0 \\ -2 \\ 1 \\ 0 \end{bmatrix} + t \begin{bmatrix} -3 \\ 0 \\ 2 \\ 0 \\ 1 \end{bmatrix} + \begin{bmatrix} 4 \\ 0 \\ -1 \\ 0 \\ 0 \end{bmatrix}$

Basis for Null(A): $[2,1,0,0,0]^T$, $[1,0,-2,1,0]^T$, $[-3,0,2,0,1]^T$ (f.eks)

c) Basis for Row(A): $[1,-2,2,3,-1]^T$, $[0,0,1,2,-2]^T$ (f.eks.)

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

e) $\begin{bmatrix} 1 \\ -1 \\ 2 \end{bmatrix}$ (f.eks)

Oppg 3

a) Egenverdier: 0, 1, 2

Egenvektorer: $t \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} \quad t \begin{bmatrix} 1 \\ -1 \\ -1 \end{bmatrix} \quad t \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} \quad (t \neq 0)$

b) $P = \begin{bmatrix} 1 & 1 & 0 \\ -1 & -1 & 1 \\ 0 & -1 & 1 \end{bmatrix}, \quad D = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 2 \end{bmatrix}$ $(f.eks.)$

c) $x = c_1 \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} + c_2 e^t \begin{bmatrix} 1 \\ -1 \\ -1 \end{bmatrix} + c_3 e^{2t} \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$

Oppg 4

a) $\begin{bmatrix} 1 \\ 1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} -1 \\ 3 \\ 4 \\ -2 \end{bmatrix}$ (f.eks.)

b) $\begin{bmatrix} 3 \\ 5 \\ 5 \\ 1 \end{bmatrix}$

Oppg 5 $A = \begin{bmatrix} 5 & -4 \\ 2 & -1 \end{bmatrix}$

Oppg 6 $x_1(t) = 100e^{-3t/5} + 200e^{-t/5}$

$x_2(t) = -200e^{-3t/5} + 400e^{-t/5}$