Norges teknisk–
naturvitenskapelige universitet
Institutt for matematiske fag

SIF5010 Matematikk 3 19.05.00

Fasit

Oppg 1 $4y = x^2$

Oppg 2

a) $y = \dfrac{e^{x^3} - e}{x^3},\ x > 0$

b) $y = c_1 e^{-2x} + c_2 e^{-x} + (2x - x^2)e^{-x}$

c) $y = c_1 e^x \cos x + c_2 e^x \sin x + 2\cos x + \sin x$

d) $y = c_1 e^x + c_2 x e^x - \frac{1}{2} e^x \ln(1 + x^2) + x e^x \arctan x$

Oppg 3 $y_3 = 1 + \frac{1}{2}\sqrt{2}$

Oppg 4

a) $\mathbf{x} = s \begin{bmatrix} -2 \\ -1 \\ 1 \\ 0 \\ 0 \end{bmatrix} + t \begin{bmatrix} -1 \\ -2 \\ 0 \\ 1 \\ 0 \end{bmatrix};\ s, t \in \mathbb{R}, \quad$ Basis for Null(A): $\begin{bmatrix} -2 \\ -1 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} -1 \\ -2 \\ 0 \\ 1 \\ 0 \end{bmatrix}$ (f.eks.)

b) Basis Row(A): $\begin{bmatrix} 1 \\ 0 \\ 2 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 1 \\ 2 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 1 \end{bmatrix}$ (f.eks.); Basis Col(A): $\begin{bmatrix} 1 \\ -1 \\ 2 \\ -2 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 3 \\ 4 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 1 \\ 7 \end{bmatrix}$ (f.eks.)

c) $a + 5b + c - d = 0$

Oppg 5

a) $\mathbf{v}_1 = \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}\ (\lambda = -1),\ \mathbf{v}_2 = \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix}\ (\lambda = 1),\ \mathbf{v}_3 = \begin{bmatrix} 2 \\ 1 \\ 2 \end{bmatrix}\ (\lambda = 6)$ (f.eks.)

$P = \begin{bmatrix} 1 & 1 & 2 \\ 0 & -2 & 1 \\ -1 & 1 & 2 \end{bmatrix}$ (f.eks.); $\quad D = \begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 6 \end{bmatrix}$

b) $\mathbf{y} = c_1 e^{-t} \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix} + c_2 e^{t} \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix} + c_3 e^{6t} \begin{bmatrix} 2 \\ 1 \\ 2 \end{bmatrix}$

c) $M = \begin{bmatrix} \frac{1}{3} & \frac{1}{3} & \frac{1}{2} \\ \frac{1}{6} & \frac{1}{3} & \frac{1}{6} \\ \frac{1}{2} & \frac{1}{3} & \frac{1}{3} \end{bmatrix}$; $\lambda_1 = -\frac{1}{6},\ \lambda_2 = \frac{1}{6},\ \lambda_3 = 1$

d) $A : 2000,\ B : 1000,\ C : 2000$