75032 Matrisemetoder 15. august 1995: Fasit

1a

$$\mathcal{N}(A) \text{ er utspent av } \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}. \quad a_3 = -\frac{1}{3}a_1 - \frac{2}{3}a_2.$$

1b

$$Aa_1 = -\frac{11}{3}a_1 - \frac{10}{3}a_2, \quad Aa_2 = \frac{13}{3}a_1 + \frac{11}{3}a_2, \quad B = \frac{1}{3}\begin{bmatrix} -11 & 13 \\ -10 & 11 \end{bmatrix}.$$

1c

$$\lambda \in \{0, i, -i\}.$$

2a

$$Q_1 = \frac{1}{3\sqrt{2}}\begin{bmatrix} 0 & 1 & * & * \\ 3 & -2 & * & * \\ 0 & 3 & * & * \\ 3 & 2 & * & * \end{bmatrix}, \quad \Sigma = \begin{bmatrix} 4 & 0 \\ 0 & 3 \\ 0 & 0 \\ 0 & 0 \end{bmatrix}, \quad Q_2 = \frac{1}{\sqrt{2}}\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}.$$

2b

$$x = \frac{1}{36}\begin{bmatrix} 17 \\ 1 \end{bmatrix}.$$

3a

$$u_k = A^k u_0 + (I - A)^{-1}(I - A^k)a.$$

4

1.

5

$$e^A = (\cos\alpha)I + \frac{\sin\alpha}{\alpha}A.$$