75032 Matrisemetoder 1996–06–06: Fasit

1a

$$L = \begin{bmatrix} 1 & 0 & 0 & 0 \\ s & 1 & 0 & 0 \\ 0 & s & 1 & 0 \\ 1 & -1 & 2 & 1 \end{bmatrix}, \quad U = \begin{bmatrix} 1 & -1 & 1 & -1 \\ 0 & 2 & 0 & 1 \\ 0 & 0 & s & 1 \\ 0 & 0 & 0 & s \end{bmatrix}, \quad \operatorname{rang} A = \begin{cases} 4 & s \neq 0 \\ 3 & s = 0 \end{cases}$$

1b Alltid en løsning, unntatt når $s = 0, t \neq 1$.

1c

$$\operatorname{rang} \begin{bmatrix} A & b \end{bmatrix} = \begin{cases} 4 & s \neq 0 \text{ eller } t \neq 1 \\ 3 & s = 0, t = 1 \end{cases}$$

2 (Ikke entydig løsning)

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

3a

$$Q = \frac{1}{2} \begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & -1 \\ 1 & -1 & 1 \\ 1 & 1 & -1 \end{bmatrix}, \quad R = \begin{bmatrix} 2 & -2 & 0 \\ 0 & 4 & -2 \\ 0 & 0 & 2 \end{bmatrix}$$

3b

$$\begin{bmatrix} 9/4 \\ -1/4 \\ -1/2 \end{bmatrix}$$

3c

$$\frac{1}{2} \begin{bmatrix} 1 \\ 1 \\ -1 \\ -1 \end{bmatrix}$$

4

$$\sum_{m=1}^{n} b_m \prod_{k=1}^{m-1} a_k$$