

## Facit:

### Tentamen 13.3.07:

1. Linjært løsensete  $\Leftrightarrow a \in \{5/3, -2\}$ ,  
lös i  $\mathbb{R}^3 \Leftrightarrow a \notin \{5/3, -2\}$ .

2.  $L = \begin{pmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 2 & 3/2 & 1 \end{pmatrix}$ ,  $D = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & -1/2 \end{pmatrix}$ ,  $U = L^T$ .

3.  $A^{-1} = \frac{1}{3} \begin{pmatrix} 0 & 1 & 1 \\ 1 & -1 & 1 \\ 1 & 1 & 0 \end{pmatrix}$ .

4.  $\left\{ \begin{array}{l} \text{Bas i } R(A): \{(2 -1 2 1)^T, (1 1 7 5)^T\}, \\ \text{Bas i } R(A^T): \{(-1 1 2 1), (0 3 3 2)\}, \\ \text{Bas i } N(A): \{(-3 -4 1 0)^T, (-2 -3 0 1)^T\}, \\ \text{Bas i } N(A^T): \{(1 -1 1 0)^T, (1 -2 0 3)^T\}. \end{array} \right.$

### Tentamen 14.3.06:

1.  $L = \begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -3 & 4 & 1 \end{pmatrix}$ ,  $U = \begin{pmatrix} 2 & 1 & -1 \\ 0 & 1 & 4 \\ 0 & 0 & -1/3 \end{pmatrix}$ .

2. Linjært løsensete.

3.  $A^{-1} = \frac{1}{12} \begin{pmatrix} -1 & 5 & -2 \\ -5 & 1 & 2 \\ 3 & -3 & 6 \end{pmatrix}$ .

4.  $\left\{ \begin{array}{l} \text{Bas i } R(A): \{(2 2 2)^T, (-3 1 -1)^T\}, \\ \text{Bas i } R(A^T): \{(2 -3 6 1), (0 2 -3 -1)\}, \\ \text{Bas i } N(A): \{(-3 6 4 0)^T, (1 2 0 4)^T\}. \end{array} \right.$

### Tentamen 27.7.04:

1.  $a \neq \frac{1}{2}$ :  $x = \frac{1-a^2}{1-2a}$ ,  $y = \frac{a-2}{1-2a}$ ,  $\underline{a = \frac{1}{2}}$ : Inkonsistent.

2.  $a_4 = \frac{3}{2}a_2 - \frac{1}{2}a_3$  ( $a_1, a_2, a_3, a_4$  vektorer)

3.  $\frac{1}{3} \begin{pmatrix} 1-3s & 2-3s & 3s \\ 1-3t & -1-3t & 3t \end{pmatrix}$ ,  $s, t \in \mathbb{R}$ .

4.  $\left\{ \begin{array}{l} \text{Bas i } R(A): \{(2 4 2)^T, (-1 2 7)^T\}, \\ \text{Bas i } R(A^T): \{(2 -1 3 0), (0 4 -8 3)\}, \\ \text{Bas i } N(A): \{(-1 4 2 0)^T, (-3 -6 0 8)^T\}, \\ \text{Bas i } N(A^T): \{(3 -2 1)^T\}. \end{array} \right.$

### Tentamen 28.7.03:

1.  $\begin{pmatrix} 1 & 1 \\ 1 & -2 \end{pmatrix}$

2.  $\left\{ \begin{array}{l} a \neq 2, a \neq -3: \begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{a-2} \begin{pmatrix} -1 \\ -1 \end{pmatrix} \\ a = 2: \text{Inkonsistent} \\ a = -3: \begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{2} \begin{pmatrix} 1 \\ 0 \end{pmatrix} + \frac{t}{2} \begin{pmatrix} 3 \\ 2 \end{pmatrix}, t \in \mathbb{R}. \end{array} \right.$

3.  $P = P_{23}$ ,  $L = \begin{pmatrix} 1 & 0 & 0 & 0 \\ -3 & 0 & 0 & 0 \\ 2 & 0 & 1 & 0 \\ 1 & 2 & 3 & 1 \end{pmatrix}$ ,  $U = \begin{pmatrix} 2 & -1 & 3 & 1 \\ 0 & 0 & 1 & 4 \\ 0 & 0 & 0 & -3 \\ 0 & 0 & 0 & 0 \end{pmatrix}$

4.  $\left\{ \begin{array}{l} \text{Bas i } R(A): \{(2 1 3 2)^T, (3 3 6 6)^T, (1 0 4 1)^T\}, \\ \text{Bas i } R(A^T): \{(1 3 2 0), (0 -3 -2 1), (0 0 0 1)\}, \\ \text{Bas i } N(A): \{(0 -2 3 0)^T\}, \\ \text{Bas i } N(A^T): \{(1 -5 -1 3)^T\}. \end{array} \right.$

### Tentamen 9.3.01:

1. Konsistent  $\Leftrightarrow -2a + 3b + c = 0$ .

2.  $P = P_{23}$ ,  $L = \begin{pmatrix} 1 & 0 & 0 \\ -2 & 1 & 0 \\ 1/2 & 0 & 1 \end{pmatrix}$ ,  $U = \begin{pmatrix} 2 & 2 & 0 & 3 \\ 0 & 6 & 1 & 6 \\ 0 & 0 & 0 & 3/2 \end{pmatrix}$ .

3.  $\left\{ \begin{array}{l} \text{Bas i } R(A): \{(-1 -9 3)^T, (0 -2 1)^T\}, \\ \text{Bas i } R(A^T): \{(-1 0 1 1), (0 1 2 5)\}, \\ \text{Bas i } N(A): \{(1 -2 1 0)^T, (1 -5 0 1)^T\}, \\ \text{Bas i } N(A^T): \{(-3 1 2)^T\}. \end{array} \right.$

4.  $a^2 \neq 1$ :  $\begin{pmatrix} \frac{1}{1-a^2} - \frac{a}{1+a} \cdot s & -\frac{a}{1-a^2} - \frac{a}{1+a} \cdot s & s \\ -\frac{a}{1-a^2} - \frac{a}{1+a} \cdot t & \frac{1}{1-a^2} - \frac{a}{1+a} \cdot t & t \end{pmatrix}$ ,  $s, t \in \mathbb{R}$ ,

$\underline{a = 1}$ : Inkonsistent,

$\underline{a = -1}$ :  $\begin{pmatrix} \frac{1}{2} + s & s & -1/2 \\ -\frac{1}{2} + t & t & -1/2 \end{pmatrix}$ .