Lösungen

1

a

$$\begin{pmatrix} 1 & 0 & 1 & 2 \\ 2 & 2 & 2 & 3 \\ 3 & 2 & 1 & -1 \\ -1 & -2 & 1 & 1 \end{pmatrix}$$

$$\begin{pmatrix} -2 \\ 1 \\ 5 \\ -2 \end{pmatrix}$$

{{x1 → -2, x2 → 1, x3 → 5, x4 → -2}}

Inverse

$$\begin{pmatrix} 1 & -\frac{1}{2} & \frac{1}{4} & -\frac{1}{4} \\ -\frac{3}{4} & \frac{1}{2} & -\frac{1}{8} & -\frac{1}{8} \\ -1 & \frac{1}{2} & \frac{1}{4} & \frac{3}{4} \\ \frac{1}{2} & 0 & -\frac{1}{4} & -\frac{1}{4} \end{pmatrix}$$

b

$$\begin{pmatrix} 1 & 0 & 1 & 2 & 5 \\ 2 & 2 & 2 & 3 & 5 \\ 3 & 2 & 1 & -1 & 5 \\ -1 & -2 & 1 & 1 & 5 \end{pmatrix}$$

$$\left\{\left\{x1 \to -2 - \frac{5\,x5}{2},\ x2 \to 1 + \frac{5\,x5}{2},\ x3 \to 5 - \frac{5\,x5}{2},\ x4 \to -2\right\}\right\}$$

c

$$\begin{pmatrix} 1 & 0 & 1 & 2 \\ 2 & 2 & 2 & 3 \\ 3 & 2 & 1 & -1 \\ 5 & 2 & 5 & 9 \\ -1 & -2 & 1 & 1 \end{pmatrix}$$

2

a b

$$\left\{\left\{\frac{-4+3\alpha}{\alpha}, \frac{2}{\alpha}, -1\right\}, \left\{-\frac{2}{\alpha}, \frac{1}{\alpha}, 0\right\}, \left\{\frac{4-2\alpha}{\alpha}, -\frac{2}{\alpha}, 1\right\}\right\}$$

$$\left\{\left\{x2 \to -\frac{-2-\beta}{\alpha}, x1 \to -\frac{2(-2+3\alpha-\beta)}{\alpha}, x3 \to -\frac{4-5\alpha+2\beta}{\alpha}\right\}\right\}$$

=2 keine Lösung. Unendlich viele Lösungen kommt nicht vor, da Zähler und Nenner nie alle gleichzeitig 0.

c d

$$\left\{\left\{\frac{-4+3\alpha}{\alpha}, \frac{2}{\alpha}, -1\right\}, \left\{-\frac{2}{\alpha}, \frac{1}{\alpha}, 0\right\}, \left\{\frac{4-2\alpha}{\alpha}, -\frac{2}{\alpha}, 1\right\}\right\}$$

$$\left\{\left\{x2 \to \frac{4}{\alpha}, x1 \to -3+\frac{8}{\alpha}-\gamma, x3 \to -\frac{8-2\alpha-\alpha\gamma}{\alpha}\right\}\right\}$$

=2 keine Lösung. Unendlich viele Lösungen kommt nicht vor, da Zähler und Nenner nie alle gleichzeitig 0.

3

$$\begin{pmatrix} 1 & 0 & 1 & 0 \\ 1 & 0 & 2 & 0 \\ 0 & 0 & 3 & 4 \\ 4 & -1+u & 6 & 1 \end{pmatrix}$$

$-4+4u$

u = 1

0

4

a A

$$\begin{pmatrix} \frac{353}{171} & \frac{4}{171} & -\frac{20}{57} \\ -\frac{118}{171} & \frac{439}{171} & \frac{28}{57} \\ -\frac{13}{19} & \frac{16}{19} & \frac{26}{19} \end{pmatrix}$$

$$\begin{pmatrix} 2.06433 & 0.0233918 & -0.350877 \\ -0.690058 & 2.56725 & 0.491228 \\ -0.684211 & 0.842105 & 1.36842 \end{pmatrix}$$

Transponiert

$$\begin{pmatrix} \frac{353}{171} & -\frac{118}{171} & -\frac{13}{19} \\ \frac{4}{171} & \frac{439}{171} & \frac{16}{19} \\ -\frac{20}{57} & \frac{28}{57} & \frac{26}{19} \end{pmatrix}$$

$$\begin{pmatrix} 2.06433 & -0.690058 & -0.684211 \\ 0.0233918 & 2.56725 & 0.842105 \\ -0.350877 & 0.491228 & 1.36842 \end{pmatrix}$$

Inverse

$$\begin{pmatrix} \frac{265}{513} & -\frac{28}{513} & \frac{26}{171} \\ \frac{52}{513} & \frac{221}{513} & -\frac{22}{171} \\ \frac{67}{342} & -\frac{50}{171} & \frac{101}{114} \end{pmatrix}$$

$$\begin{pmatrix} 0.516569 & -0.0545809 & 0.152047 \\ 0.101365 & 0.430799 & -0.128655 \\ 0.195906 & -0.292398 & 0.885965 \end{pmatrix}$$

Lösung

$$\left\{\left\{x1 \to \frac{265}{513},\ x2 \to \frac{52}{513},\ x3 \to \frac{67}{342}\right\}\right\}$$

$$\{\{x1 \to 0.516569,\ x2 \to 0.101365,\ x3 \to 0.195906\}\}$$

5

Gerade

$-3\,(8-3\,t)+2\,(5+2\,t)+5\,(11+5\,t)==4$

Schnittpunkt

$\left\{t\to -\frac{37}{38}\right\}$

$\left\{\frac{58}{19},\ \frac{415}{38},\ \frac{233}{38}\right\}$

Normierter Normalenvektor

{0.324443, −0.486664, 0.811107}

Gesuchter Punkt

$\left\{\frac{58}{19}+10\sqrt{\frac{2}{19}},\ \frac{415}{38}-15\sqrt{\frac{2}{19}},\ \frac{233}{38}+25\sqrt{\frac{2}{19}}\right\}$

{6.29706, 6.05441, 14.2427}