Zad 2

$L \cdot U \cdot x = b$ $\qquad b = \begin{pmatrix} 1 \\ -1 \\ 2 \end{pmatrix}$

$L \cdot z = b$

$U \cdot x = z$

$z = \begin{pmatrix} a \\ b \\ c \end{pmatrix} \qquad x = \begin{pmatrix} x \\ y \\ z \end{pmatrix}$

$L = z = a$

$\begin{pmatrix} 1 & 0 & 0 \\ 1{,}5 & 1 & 0 \\ 0{,}5 & 11/13 & 1 \end{pmatrix} \cdot \begin{pmatrix} a \\ b \\ c \end{pmatrix} = \begin{pmatrix} a+0b+0c \\ 1{,}5a+b+0c \\ 0{,}5a+11/13b+c \end{pmatrix}$

$\begin{pmatrix} a+0b+0c \\ 1{,}5a+b+0c \\ 0{,}5a+11/13b+c \end{pmatrix} = \begin{pmatrix} 1 \\ -1 \\ 2 \end{pmatrix}$

$a = 1$

$1{,}5 + b = -1 \Rightarrow b = -2{,}5$

$0{,}5 + -\frac{27{,}5}{13} + c = 2$

$-\frac{27{,}5}{13} + c = 1{,}5$

$-2\frac{1{,}5}{13} + c = 1{,}5$

$-2\frac{15}{130} + c = 1{,}5$

$-2\frac{3}{26} + c = 1{,}5$

$c = 1{,}5 + 2\frac{3}{26} = 1\frac{13}{26} + 2\frac{3}{26} = 3\frac{16}{26} = 3\frac{8}{13}$

$z = \begin{pmatrix} 1 \\ -2{,}5 \\ 3\frac{8}{13} \end{pmatrix}$

$U = x = \begin{pmatrix} 2 & -3 & -1 \\ 0 & 13/2 & -7/2 \\ 0 & 0 & 32/13 \end{pmatrix} \cdot \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 2x-3y-z \\ 0x+\frac{13}{2}y-\frac{7}{2}z \\ 0x+0y+\frac{32}{13}z \end{pmatrix}$

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$$\begin{pmatrix} 2x-3y-z \\ \frac{13}{2}y-\frac{4}{2}z \\ \frac{32}{13}z \end{pmatrix} = \begin{pmatrix} 1 \\ -2,5 \\ 3\frac{8}{13} \end{pmatrix}$$

$$\frac{32}{13}z = \frac{47}{13} \quad | \cdot 13$$

$$32z = 47$$

$$z = \frac{47}{32} = 1\frac{15}{32}$$

$$\frac{13}{2}y - \frac{4}{2} \cdot \frac{47}{32} = -2,5 \quad | \cdot 2$$

$$13y - \frac{4 \cdot 47}{32} = -5$$

$$13y - \frac{376}{32} = -5 \quad | + 5$$

$$13y = \frac{168}{32} \quad | : 13$$

$$y = \frac{168}{32} \cdot \frac{1}{13} = \frac{13}{32}$$

$$2x - \frac{39}{32} - \frac{47}{32} = 1$$

$$2x - \frac{86}{32} = 1$$

$$2x = 1\frac{86}{32}$$

$$2x = \frac{118}{32}$$

$$x = \frac{59}{32}$$

$$x = \begin{pmatrix} \frac{59}{32} \\ \frac{13}{32} \\ \frac{47}{32} \end{pmatrix}$$

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