

Lineare Gleichungssysteme Aufgabe 51

$$\begin{aligned}x + y + z &= 8 \\3x + 2y + z &= 49 \\5x - 3y + z &= 0\end{aligned}$$

$$D = \begin{vmatrix} 1 & 1 & 1 \\ 3 & 2 & 1 \\ 5 & -3 & 1 \end{vmatrix} = 1 * \begin{vmatrix} 2 & 1 \\ -3 & 1 \end{vmatrix} - 1 * \begin{vmatrix} 3 & 1 \\ 5 & 1 \end{vmatrix} + 1 * \begin{vmatrix} 3 & 2 \\ 5 & -3 \end{vmatrix} =$$

$$= 1 * (2 * 1 - 1 * (-3)) - 1 * (3 * 1 - 5 * 1) + 1 * (3 * (-3) - 5 * 2)$$

$$= 2 + 3 - 3 + 5 - 9 - 10 = -12$$

$$D_x = \begin{vmatrix} 8 & 1 & 1 \\ 49 & 2 & 1 \\ 0 & -3 & 1 \end{vmatrix} = 8 * \begin{vmatrix} 2 & 1 \\ -3 & 1 \end{vmatrix} - 1 * \begin{vmatrix} 49 & 1 \\ 0 & 1 \end{vmatrix} + 1 * \begin{vmatrix} 49 & 2 \\ 0 & -3 \end{vmatrix} =$$

$$= 8 * (2 * 1 - 1 * (-3)) - 1 * (49 * 1 - 0 * 1) + 1 * (49 * (-3) - 0 * 2)$$

$$= 8 * (2 + 3) - 1 * 49 + 1 * (-147) = -156$$

$$D_y = \begin{vmatrix} 1 & 8 & 1 \\ 3 & 49 & 1 \\ 5 & 0 & 1 \end{vmatrix} = 1 * \begin{vmatrix} 49 & 1 \\ 0 & 1 \end{vmatrix} - 8 * \begin{vmatrix} 3 & 1 \\ 5 & 1 \end{vmatrix} + 1 * \begin{vmatrix} 3 & 49 \\ 5 & 0 \end{vmatrix} =$$

$$= 1 * (49 * 1 - 0 * 1) - 8 * (3 * 1 - 5 * 1) + 1 * (3 * 0 - 5 * 49)$$

$$= 1 * 49 - 8 * (-2) + 1 * (-245) = -180$$

$$D_z = \begin{vmatrix} 1 & 1 & 8 \\ 3 & 2 & 49 \\ 5 & -3 & 0 \end{vmatrix} = 1 * \begin{vmatrix} 2 & 49 \\ -3 & 0 \end{vmatrix} - 1 * \begin{vmatrix} 3 & 49 \\ 5 & 0 \end{vmatrix} + 8 * \begin{vmatrix} 3 & 2 \\ 5 & -3 \end{vmatrix} =$$

$$= 1 * (2 * 0 - (-3) * 49) - 1 * (3 * 0 - 5 * 49) + 8 * (3 * (-3) - 5 * 2)$$

$$= 1 * 147 - 1 * (-245) + 8 * (-9 - 10) = 240$$

$$\mathbf{x} = \frac{D_x}{D} = \frac{-156}{-12} = \mathbf{13}$$

$$\mathbf{y} = \frac{D_y}{D} = \frac{-180}{-12} = \mathbf{15}$$

$$\mathbf{z} = \frac{D_z}{D} = \frac{240}{-12} = \mathbf{-20}$$