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$$\begin{array}{l} a) E_1: x - y + 2z = 7 \\ E_2: 6x + y - z = -7 \end{array} \quad \downarrow +$$

$$\begin{array}{r} x - y + 2z = 7 \\ 7x \quad \quad + z = 0 \end{array}$$

z ist Parameter

$$\begin{array}{r} x - y = 7 - 2z \\ 7x = -z \end{array}$$

$$x = -\frac{1}{7}z$$

$$\begin{array}{l} \rightarrow -y = 7 - 2z + \frac{1}{7}z \\ -y = -7 + \frac{13}{7}z \end{array}$$

$$\begin{array}{l} \rightarrow x = -\frac{1}{7}z \\ y = -7 + \frac{13}{7}z \\ z = z \end{array}$$

$$\rightarrow \vec{x} = \begin{pmatrix} 0 \\ -7 \\ 0 \end{pmatrix} + t \begin{pmatrix} -\frac{1}{7} \\ \frac{13}{7} \\ 1 \end{pmatrix}$$

$$\text{bzw: } \vec{x} = \begin{pmatrix} 0 \\ -7 \\ 0 \end{pmatrix} + t \begin{pmatrix} -1 \\ 13 \\ 7 \end{pmatrix}$$

x ist Parameter

$$\text{oder } -y + 2z = 7 - x$$

$$z = -7x$$

$$\rightarrow z = -7x$$

$$-y = 7 - x + 14x$$

$$-y = 7 + 13x$$

$$y = -7 - 13x$$

$$x = x$$

$$y = -7 - 13x$$

$$z = -7x$$

$$\rightarrow \vec{x} = \begin{pmatrix} 0 \\ -7 \\ 0 \end{pmatrix} + t \begin{pmatrix} 1 \\ -13 \\ -7 \end{pmatrix}$$

$$\rightarrow \vec{x} = \begin{pmatrix} 0 \\ -7 \\ 0 \end{pmatrix} + t \begin{pmatrix} -1 \\ 13 \\ 7 \end{pmatrix}$$

$$b) \vec{x} = \begin{pmatrix} 3 \\ -4 \\ 0 \end{pmatrix} + t \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$$

$$c) \vec{x} = \begin{pmatrix} 8 \\ -7 \\ 0 \end{pmatrix} + t \begin{pmatrix} -5 \\ 4 \\ 1 \end{pmatrix}$$

geg: $E: 2x - y - z = 1$ $E_1: \vec{x} = \begin{pmatrix} 3 \\ 1 \\ 5 \end{pmatrix} + r \begin{pmatrix} 2 \\ -1 \\ 0 \end{pmatrix} + s \begin{pmatrix} -1 \\ 0 \\ 3 \end{pmatrix}$

$$\hookrightarrow \begin{vmatrix} 2 & -1 & \oplus x-3 \\ -1 & 0 & \oplus y-1 \\ 0 & 3 & \oplus z-5 \end{vmatrix} = 0$$

Umwandlung in
Koordinatengleichung
auch auf andere
Wege möglich

$$(x-3) \cdot \begin{vmatrix} -1 & 0 \\ 0 & 3 \end{vmatrix} - (y-1) \cdot \begin{vmatrix} 2 & -1 \\ 0 & 3 \end{vmatrix} + (z-5) \cdot \begin{vmatrix} 2 & -1 \\ -1 & 0 \end{vmatrix} = 0$$

$$(x-3) \cdot (-3) - (y-1) \cdot 6 + (z-5) \cdot (-1) = 0$$

$$-3x + 9 - 6y + 6 - z + 5 = 0$$

$$\downarrow -3x - 6y - z = -20$$

$$\text{bzw. } \underline{3x + 6y + z = 20}$$

$$\begin{array}{l|l} \nearrow & E: 2x - y - z = 1 \\ & E_1: 3x + 6y + z = 20 \\ \hline & 2x - y - z = 1 \\ & 5x + 5y = 21 \end{array} \quad \downarrow +$$

y als Parameter

$$\begin{array}{l} \nearrow 2x - z = 1 + y \\ 5x = 21 - 5y \end{array}$$

$$\nearrow \underline{x = \frac{21}{5} - y}$$

$$2\left(\frac{21}{5} - y\right) - z = 1 + y$$

$$\frac{42}{5} - 2y - z = 1 + y$$

$$-z = -\frac{37}{5} + 3y$$

$$\underline{z = \frac{37}{5} - 3y}$$

$$\nearrow x = \frac{21}{5} - y$$

$$y = y$$

$$z = \frac{37}{5} - 3y$$

$$\nearrow \vec{x} = \begin{pmatrix} \frac{21}{5} \\ y \\ 0 \\ \frac{37}{5} \end{pmatrix} + t \begin{pmatrix} -1 \\ 1 \\ -3 \end{pmatrix}$$

$$\underline{\underline{\vec{x} = \frac{1}{5} \begin{pmatrix} 21 \\ 0 \\ 37 \end{pmatrix} + t \begin{pmatrix} -1 \\ 1 \\ -3 \end{pmatrix}}}$$

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(3)

$$5c) \quad 2x - 3y + 5z = 60$$

$$xyE: \quad \underline{\hspace{10em}} \quad z = 0$$

$$\rightarrow 2x - 3y = 60$$

Spurgerade!

$$\underline{x = 30 + \frac{3}{2}y} \quad \text{oder} \quad \underline{y = \frac{2}{3}x - 20}$$

$$\rightarrow x = 30 + \frac{3}{2}y$$

$$y = y$$

$$z = 0$$

$$\rightarrow \vec{x} = \begin{pmatrix} 30 \\ 0 \\ 0 \end{pmatrix} + t \begin{pmatrix} 3 \\ 2 \\ 0 \end{pmatrix}$$

$$2x - 3y + 5z = 60$$

$$xzE: \quad \underline{\hspace{10em}} \quad y = 0$$

$$\rightarrow 2x + 5z = 60$$

Spurgerade!

$$\underline{x = 30 - \frac{5}{2}z}$$

$$\rightarrow x = 30 - \frac{5}{2}z$$

$$y = 0$$

$$z = z$$

$$\rightarrow \vec{x} = \begin{pmatrix} 30 \\ 0 \\ 0 \end{pmatrix} + t \begin{pmatrix} -5 \\ 0 \\ 2 \end{pmatrix}$$

$$2x - 3y + 5z = 60$$

$$yzE: \quad \underline{\hspace{10em}} \quad x = 0$$

$$\rightarrow -3y + 5z = 60$$

Spurgerade!

$$\underline{y = -20 + \frac{5}{3}z}$$

$$\rightarrow x = 0$$

$$y = -20 + \frac{5}{3}z$$

$$z = z$$

$$\rightarrow \vec{x} = \begin{pmatrix} 0 \\ -20 \\ 0 \end{pmatrix} + t \begin{pmatrix} 0 \\ 5 \\ 3 \end{pmatrix}$$