

$$S \text{ B9 Nr. 2} \quad \left| \begin{array}{ccc} 1 & -3 & 1 \\ -1 & 2 & -3 \\ 2 & 1 & 4 \end{array} \right| = \left. \begin{array}{l} 8 + 18 - 1 \\ \ominus \\ 4 + 12 - 3 \end{array} \right\} 25 - 13 = \underline{\underline{12}}$$

$$\begin{pmatrix} -2 \\ -6 \\ 16 \end{pmatrix} = 2 \cdot \begin{pmatrix} -1 \\ -3 \\ 8 \end{pmatrix}$$

$$D_1 = 2 \cdot \begin{array}{c} \downarrow \\ \left| \begin{array}{ccc} -1 & -3 & 1 \\ -3 & 2 & -3 \\ 8 & 1 & 4 \end{array} \right| \end{array} = 2 \cdot \left\{ \begin{array}{l} -8 + 72 - 3 \\ \ominus \\ 16 + 36 + 3 \end{array} \right\} x_1 = \frac{12}{12} = 1$$

$$2 \cdot (61 - 55) = 2 \cdot 6 = 12$$

$$\vec{x} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$$

$$D_2 = 2 \cdot \left| \begin{array}{ccc} 1 & -1 & 1 \\ -1 & -3 & -3 \\ 2 & 8 & 4 \end{array} \right| = 2 \cdot \left\{ \begin{array}{l} -17 + 6 - 8 \\ \ominus \\ -6 + 4 - 24 \end{array} \right\} = 2 \cdot (-14 + 26) = 24$$

$$\Rightarrow x_2 = \frac{24}{12} = 2$$

$$D_3 = 2 \cdot \left| \begin{array}{ccc} +1 & -3 & -1 \\ -1 & 2 & -3 \\ 2 & 1 & 8 \end{array} \right| = 2 \cdot \left\{ \begin{array}{l} 16 + 18 + 1 \\ \ominus \\ -4 + 24 - 3 \end{array} \right\} = 2 \cdot (35 - 17) = \frac{36}{12} = \underline{\underline{3}}$$

S 143 Nr 1) b)

$$\left( \begin{array}{ccc|c} 1 & -2 & 1 & 1 \\ -3 & 1 & 5 & -11 \\ -1 & -3 & 7 & -9 \\ 4 & -3 & -1 & 12 \end{array} \right) \begin{array}{l} | \cdot 3 \rangle + \\ \downarrow + \\ \downarrow + \end{array} \begin{array}{l} | \cdot (-4) \\ \downarrow + \end{array}$$

$$\left( \begin{array}{ccc|c} 1 & -2 & 1 & 1 \\ 0 & -5 & 8 & -8 \\ 0 & -5 & 8 & -8 \\ 0 & 5 & -8 & 8 \end{array} \right) \begin{array}{l} | (-1) \rangle + \\ \downarrow + \\ \downarrow + \end{array}$$

$$x_3 = \alpha //$$

$$-5x_2 + 8\alpha = -8$$

$$x_2 = \frac{8}{5} + \frac{8}{5}\alpha //$$

$$\left( \begin{array}{ccc|c} 1 & -2 & 1 & 1 \\ 0 & -5 & 8 & -8 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{array} \right)$$

$$x_1 = 1 + 2x_2 - x_3$$

$$x_1 = 1 + 2 \cdot \left( \frac{8}{5} + \frac{8}{5}\alpha \right) - \alpha$$

$$x_1 = 1 + \frac{16}{5} + \frac{11}{5}\alpha$$

$$x_1 = \frac{21}{5} + \frac{11}{5}\alpha //$$

$$\vec{x} = \begin{pmatrix} \frac{21}{5} + \frac{11}{5}\alpha \\ \frac{8}{5} + \frac{8}{5}\alpha \\ 0 + \alpha \end{pmatrix} = \begin{pmatrix} 21/5 \\ 8/5 \\ 0 \end{pmatrix} + \alpha \begin{pmatrix} 11/5 \\ 8/5 \\ 1 \end{pmatrix}$$
$$= \begin{pmatrix} 21/5 \\ 8/5 \\ 0 \end{pmatrix} + \alpha \begin{pmatrix} 11 \\ 8 \\ 5 \end{pmatrix}$$

S 143 Nr. 25

$$\left( \begin{array}{cccc|c} 2 & -1 & -1 & 2 & 3 \\ 6 & -2 & 3 & -1 & -3 \\ -4 & 2 & 3 & -2 & -2 \\ 2 & 0 & 4 & -3 & -1 \end{array} \right) \begin{array}{l} |(-3)|_+ \\ |(-2)|_+ \\ |(-1)|_+ \end{array}$$

$$\left( \begin{array}{cccc|c} 2 & -1 & -1 & 2 & 3 \\ 0 & 1 & 6 & -7 & -12 \\ 0 & 0 & 1 & 2 & 4 \\ 0 & 1 & 5 & -5 & -4 \end{array} \right) |(-1)|_+$$

$$\left( \begin{array}{cccc|c} 2 & -1 & -1 & 2 & 3 \\ 0 & 1 & 6 & -7 & -12 \\ 0 & 0 & 1 & 2 & 4 \\ 0 & 0 & -1 & 2 & 8 \end{array} \right) |_+$$



$$\begin{array}{cccc|c}
 x_1 & x_2 & x_3 & x_4 & \\
 \hline
 2 & -1 & -1 & 2 & 3 \\
 0 & 1 & 6 & -7 & -17 \\
 0 & 0 & 1 & 2 & 4 \\
 0 & 0 & 0 & 4 & 12
 \end{array}$$

$$\begin{array}{l}
 4 \cdot x_4 = 12 \quad \Rightarrow \quad x_4 = 3 \\
 x_3 + 2 \cdot 3 = 4 \quad \Rightarrow \quad x_3 = -2 \\
 x_2 - 1 - 2 \cdot 1 = -17 \quad \Rightarrow \quad x_2 = 21 \\
 2x_1 - 2 \cdot 1 + 2 + 6 = 3 \quad \Rightarrow \quad 2x_1 = 16 \quad \Rightarrow \quad x_1 = 8
 \end{array}
 \left. \vphantom{\begin{array}{l} \\ \\ \\ \end{array}} \right\} \vec{x} = \begin{pmatrix} 8 \\ 21 \\ -2 \\ 3 \end{pmatrix}$$

