

Vješta za test

Yours

$$\left[\begin{array}{ccc|c} 5 & -1 & -1 & 2 \\ 3 & -1 & 1 & 4 \\ 1 & 2 & -1 & 1 \end{array} \right]$$

$$\left[\begin{array}{ccc|c} 1 & 2 & -1 & 1 \\ 3 & -1 & 1 & 4 \\ 5 & -1 & -1 & 2 \end{array} \right] \begin{array}{l} /(-3) \\ \leftarrow \\ \leftarrow \end{array}$$

$$\left[\begin{array}{ccc|c} 1 & 2 & -1 & 1 \\ 0 & -7 & 4 & 1 \\ 0 & -11 & 4 & -3 \end{array} \right] /:(-7)$$

$$\left[\begin{array}{ccc|c} 1 & 2 & -1 & 1 \\ 0 & 1 & -\frac{4}{7} & -\frac{1}{7} \\ 0 & -11 & 4 & -3 \end{array} \right] \begin{array}{l} \leftarrow \\ / \cdot (-2) \quad / \cdot 11 \\ \leftarrow \end{array}$$

$$\left[\begin{array}{ccc|c} 1 & 0 & \frac{1}{7} & \frac{9}{7} \\ 0 & 1 & -\frac{4}{7} & -\frac{1}{7} \\ 0 & 0 & -\frac{16}{7} & -\frac{32}{7} \end{array} \right] /: \left(-\frac{16}{7}\right)$$

$$\left[\begin{array}{ccc|c} 1 & 0 & \frac{1}{7} & \frac{9}{7} \\ 0 & 1 & -\frac{4}{7} & -\frac{1}{7} \\ 0 & 0 & 1 & 2 \end{array} \right] \begin{array}{l} \leftarrow \\ \leftarrow \\ / \cdot \left(\frac{4}{7}\right) \quad / \cdot \left(-\frac{1}{7}\right) \end{array}$$

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 2 \end{array} \right]$$

$x = 1$
 $y = 1$
 $z = 2$

$$\left| \begin{array}{ccc|cc} 1 & 2 & 3 & 4 & 2 \\ 2 & 1 & 0 & 2 & 1 \\ 3 & 1 & 2 & 3 & 1 \end{array} \right|$$

$$= 2 + 6 - (8 + 0) = 8 - 17 = -9$$

$$\left[\begin{array}{cccc|c} 1 & 2 & 1 & 2 & \\ 3 & 1 & 3 & 1 & \\ 1 & 3 & 1 & 3 & \\ 2 & 1 & 2 & 1 & \end{array} \right] \begin{array}{l} / \cdot (-3) \quad / \cdot (-1) \quad / \cdot (-2) \\ \leftarrow \\ \leftarrow \\ \leftarrow \end{array} \left[\begin{array}{cccc|c} 1 & -2 & -1 & -2 & \\ 0 & -5 & 0 & -5 & \\ 0 & 1 & 0 & 1 & \\ 0 & -3 & 0 & -3 & \end{array} \right]$$

$$1 \cdot \left[\begin{array}{cccc|c} -5 & 0 & -5 & -5 & 0 \\ 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & -3 & -3 & 0 \end{array} \right] = 0 = 0$$

$$A = \begin{bmatrix} 0 & 2 \\ -1 & 3 \end{bmatrix} \quad B = \begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}$$

$$c) \quad B \cdot A - A \cdot X = I$$

$$\rightarrow A^{-1} / -A \cdot X = I - B \cdot A$$

$$X = A^{-1} \cdot I - B \cdot A \quad \begin{bmatrix} \frac{3}{2} & -1 \\ 0.5 & 0 \end{bmatrix} \cdot \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} - \begin{bmatrix} 1 & -1 \\ -1 & 5 \end{bmatrix}$$

~~$$X = \frac{1}{2} \cdot \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} - \begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix} \cdot \begin{bmatrix} 0 & 2 \\ -1 & 3 \end{bmatrix} \begin{bmatrix} \frac{3}{2} & -1 \\ 0.5 & 0 \end{bmatrix} - \begin{bmatrix} 1 & -1 \\ -1 & 5 \end{bmatrix}$$~~

~~$$X = \frac{1}{2} \cdot \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} - \begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix} \cdot \begin{bmatrix} 0 & 2 \\ -1 & 3 \end{bmatrix} \begin{bmatrix} \frac{3}{2} & -1 \\ 0.5 & 0 \end{bmatrix} - \begin{bmatrix} 1 & -1 \\ -1 & 5 \end{bmatrix}$$~~

~~$$X = \begin{bmatrix} \frac{1}{2} & 0 \\ 0 & \frac{1}{2} \end{bmatrix} - \begin{bmatrix} 1 & -1 \\ -1 & 5 \end{bmatrix} = \begin{bmatrix} -\frac{1}{2} & 1 \\ 1 & -4.5 \end{bmatrix}$$~~

$$X = \begin{bmatrix} \frac{1}{2} & 0 \\ 0 & \frac{1}{2} \end{bmatrix} - \begin{bmatrix} 1 & -1 \\ -1 & 5 \end{bmatrix} = \begin{bmatrix} -\frac{1}{2} & 1 \\ 1 & -4.5 \end{bmatrix}$$

$$E(7, -2) \quad D(6, 2) \quad B(-1, -1)$$

$$\vec{Q} = \vec{EB} - \vec{BD}$$

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$$2 \cdot (-5, 1) - (7, 3)$$

$$(-10, 2) - (7, 3)$$

$$(-17, -1)$$

1. 2. beiden

$$A = \begin{bmatrix} 1 & -2 \\ 2 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 0 & -1 \\ 0 & 2 & 2 \end{bmatrix} \quad C = \begin{bmatrix} 2 & -1 \\ -1 & 1 \\ 0 & 2 \end{bmatrix}$$

$$2 \cdot \begin{bmatrix} 1 & 2 \\ -2 & 1 \end{bmatrix} + \frac{1}{2} X = \begin{bmatrix} 1 & 0 & -1 \\ 0 & 2 & 2 \end{bmatrix} \cdot \begin{bmatrix} 2 & -1 \\ -1 & 1 \\ 0 & 2 \end{bmatrix}$$

$$\frac{1}{2} X = \begin{bmatrix} 1 & 0 & -1 \\ 0 & 2 & 2 \end{bmatrix} \cdot \begin{bmatrix} 2 & -1 \\ -1 & 1 \\ 0 & 2 \end{bmatrix} - \begin{bmatrix} 2 & 4 \\ -4 & 2 \end{bmatrix}$$

$$\frac{1}{2} X = \begin{bmatrix} 2 & -3 \\ -2 & 6 \end{bmatrix} - \begin{bmatrix} 2 & 4 \\ -4 & 2 \end{bmatrix}$$

$$\frac{1}{2} X = \begin{bmatrix} 0 & -7 \\ 2 & 4 \end{bmatrix}$$

$$X = \begin{bmatrix} 0 & -14 \\ 4 & 8 \end{bmatrix}$$

2.

$$\begin{array}{l} \left[\begin{array}{ccc|c} 1 & -2 & 1 & -1 \\ 2 & 1 & 0 & -3 \\ -1 & -3 & 1 & -4 \end{array} \right] \begin{array}{l} / \cdot (-2) \\ / \cdot 1 \end{array} \left[\begin{array}{ccc|c} 1 & -2 & 1 & -1 \\ 0 & 5 & -2 & -1 \\ 0 & -5 & 2 & -5 \end{array} \right] \end{array}$$

$$\begin{array}{l} \left[\begin{array}{ccc|c} 1 & -2 & 1 & -1 \\ 0 & 1 & -\frac{2}{5} & -\frac{1}{5} \\ 0 & -5 & 2 & -5 \end{array} \right] \begin{array}{l} \leftarrow \\ / \cdot 2 \quad / \cdot 5 \end{array} \left[\begin{array}{ccc|c} 1 & 0 & \frac{1}{5} & -\frac{7}{5} \\ 0 & 1 & -\frac{2}{5} & -\frac{1}{5} \\ 0 & 0 & 0 & 6 \end{array} \right] \end{array}$$

4, 5 boden

$$x + \frac{1}{5}z = -\frac{7}{5}$$

$$x = -\frac{7}{5} - \frac{1}{5}z$$

$$\frac{1}{5}z = -x - \frac{7}{5} \quad | \cdot \frac{1}{5}$$

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

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

$$z = -\frac{1}{5}x - 7$$

$$-\frac{2}{5}z = \frac{1}{5} - y \quad | \cdot (-\frac{5}{2})$$

$$z = -0.5 + \frac{2}{5}y$$

3. 3 boden

$$A = \left[\begin{array}{ccc|ccc} 1 & 0 & -1 & 1 & 0 & 0 \\ 2 & 1 & 2 & 0 & 1 & 0 \\ 2 & 1 & 0 & 0 & 0 & 1 \end{array} \right] \begin{array}{l} | \cdot (-2) \\ \leftarrow \\ \leftarrow \end{array} \left[\begin{array}{ccc|ccc} 1 & 0 & -1 & 1 & 0 & 0 \\ 0 & 1 & 4 & -2 & 1 & 0 \\ 0 & 1 & 2 & -2 & 0 & 1 \end{array} \right] \begin{array}{l} | \cdot (-1) \\ \leftarrow \end{array}$$

$$\left[\begin{array}{ccc|ccc} 1 & 0 & -1 & 1 & 0 & 0 \\ 0 & 1 & 4 & -2 & 1 & 0 \\ 0 & 0 & -2 & 0 & -1 & 1 \end{array} \right] \begin{array}{l} | \cdot (-2) \\ \leftarrow \end{array} \left[\begin{array}{ccc|ccc} 1 & 0 & -1 & 1 & 0 & 0 \\ 0 & 1 & 4 & -2 & 1 & 0 \\ 0 & 0 & 1 & 0 & \frac{1}{2} & -\frac{1}{2} \end{array} \right] \begin{array}{l} \leftarrow \\ \leftarrow \\ | \cdot (-4) / \cdot 1 \end{array}$$

$$\left[\begin{array}{ccc|ccc} 1 & 0 & 0 & 1 & \frac{1}{2} & -\frac{1}{2} \\ 0 & 1 & 0 & -2 & -1 & 2 \\ 0 & 0 & 1 & 0 & \frac{1}{2} & -\frac{1}{2} \end{array} \right] = A^{-1}$$

4. 3 boden

$$\left[\begin{array}{cccc} 2 & 1 & 3 & 0 \\ 0 & -1 & -1 & 1 \\ 2 & 1 & -2 & 0 \\ 1 & -2 & 1 & 2 \end{array} \right] \begin{array}{l} | \cdot (-2) \\ | \cdot (-2) \\ \leftarrow \\ \leftarrow \end{array} \left[\begin{array}{cccc} 2 & -1 & 3 & 0 \\ 0 & -1 & -1 & 1 \\ 2 & 1 & -2 & 0 \\ 1 & 0 & 3 & 0 \end{array} \right] \begin{array}{l} \leftarrow \\ \leftarrow \\ \leftarrow \end{array} \quad 1. \left[\begin{array}{ccc} 2 & 1 & 3 \\ 2 & 1 & -2 \\ 1 & 0 & 3 \end{array} \right]$$

$$\left[\begin{array}{ccc|ccc} 2 & 1 & 3 & 2 & 1 & \\ 2 & 1 & -2 & 2 & 1 & \\ 1 & 0 & 3 & 1 & 0 & \end{array} \right] = 6 - 2 - (6 + 3) = -5$$

5. 0,5 Punkte

$$A = \begin{bmatrix} 1 & -2 \\ 2 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 2 & -1 \\ -1 & 3 \end{bmatrix}$$

$$A \cdot X + B \cdot X = 2I$$

$$X \cdot (A + B) = 2I$$

$$X = 2 \cdot (A + B)^{-1}$$

$$X = 2 \cdot \left(\begin{bmatrix} 1 & -2 \\ 2 & 1 \end{bmatrix} + \begin{bmatrix} 2 & -1 \\ -1 & 3 \end{bmatrix} \right)^{-1}$$

$$X = 2 \cdot \begin{pmatrix} 4 & -7 \\ 3 & 1 \end{pmatrix}^{-1}$$

$$X = \begin{bmatrix} \frac{2}{25} & \frac{14}{25} \\ \frac{6}{25} & \frac{8}{25} \end{bmatrix}$$

$$\left[\begin{array}{cc|cc} 4 & -7 & 1 & 0 \\ 3 & 1 & 0 & 1 \end{array} \right] \begin{array}{l} /: 4 \\ \end{array}$$

$$\left[\begin{array}{cc|cc} 1 & -\frac{7}{4} & \frac{1}{4} & 0 \\ 0 & \frac{25}{4} & -\frac{3}{4} & 1 \end{array} \right] \begin{array}{l} / \cdot (-3) \\ /: \frac{25}{4} \end{array}$$

$$\left[\begin{array}{cc|cc} 1 & -\frac{7}{4} & \frac{1}{4} & 0 \\ 0 & 1 & -\frac{3}{25} & \frac{4}{25} \end{array} \right] \begin{array}{l} \leftarrow \\ /: \frac{7}{4} \end{array}$$

$$\left[\begin{array}{cc|cc} 1 & 0 & \frac{1}{25} & \frac{7}{25} \\ 0 & 1 & -\frac{3}{25} & \frac{4}{25} \end{array} \right]$$

6. 1 Punkt

$$\begin{array}{l} A(1, 0, -2) \\ B(2, -1, 1) \\ C(-2, 2, 0) \end{array}$$

$$\vec{BA} = (-1, 1, -3)$$

$$\vec{BC} = (-4, 3, -1)$$

2) $\vec{BA} - 2 \cdot \vec{BC}$

$$|(-1, 1, -3) - 2 \cdot (-4, 3, -1)|$$

$$|(-1, 1, -3) - (-8, 6, -2)|$$

$$|(7, -5, -1)|$$

1 Punkt

c) $\vec{BC} \cdot \vec{BA}$

$$= (-4) \cdot (-1) + 3 \cdot (-3) + (-1) \cdot (-2)$$

$$= 4 - 9 + 2 = -3$$