

Redukcja Gaussa-Jordana. Przykład 1

Wojciech Domitrz

MiNI PW
Algebra Liniowa z Geometrią 1

$$\begin{cases} x_1 + 3x_3 + 2x_4 - x_5 = -1 \\ 2x_4 + 4x_5 = 1 \\ x_1 + 3x_2 + 9x_3 - 3x_4 + 8x_5 = 3 \\ x_2 + 2x_3 + 3x_4 - x_5 = 4 \end{cases}$$

$$\begin{pmatrix} 1 & 0 & 3 & 2 & -1 & -1 \\ 0 & 0 & 0 & 2 & 4 & 1 \\ 1 & 3 & 9 & -3 & 8 & 3 \\ 0 & 1 & 2 & 3 & -1 & 4 \end{pmatrix}$$

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$$r_3 \rightarrow r_3 - a_{31}r_1$$

$$\begin{pmatrix} 1 & 0 & 3 & 2 & -1 & -1 \\ 0 & 0 & 0 & 2 & 4 & 1 \\ 0 & 3 & 6 & -5 & 9 & 4 \\ 0 & 1 & 2 & 3 & -1 & 4 \end{pmatrix}$$

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$$r_2 \rightarrow (1/a_{22})r_2$$

$$\begin{pmatrix} 1 & 0 & 3 & 2 & -1 & -1 \\ 0 & 1 & 2 & -\frac{5}{3} & 3 & \frac{4}{3} \\ 0 & 0 & 0 & 2 & 4 & 1 \\ 0 & 1 & 2 & 3 & -1 & 4 \end{pmatrix}$$

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$$r_4 \rightarrow r_4 - a_{42}r_2$$

$$\begin{pmatrix} 1 & 0 & 3 & 2 & -1 & -1 \\ 0 & 1 & 2 & -\frac{5}{3} & 3 & \frac{4}{3} \\ 0 & 0 & 0 & 2 & 4 & 1 \\ 0 & 0 & 0 & \frac{14}{3} & -4 & \frac{8}{3} \end{pmatrix}$$

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$$r_3 \rightarrow (1/a_{34})r_3$$

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$$r_1 \rightarrow r_1 - a_{14}r_3$$

$$r_2 \rightarrow r_2 - a_{24}r_3$$

$$r_4 \rightarrow r_4 - a_{44}r_3$$

$$\begin{pmatrix} 1 & 0 & 3 & 0 & -5 & -2 \\ 0 & 1 & 2 & 0 & \frac{19}{3} & \frac{13}{6} \\ 0 & 0 & 0 & 1 & 2 & \frac{1}{2} \\ 0 & 0 & 0 & 0 & -\frac{40}{3} & \frac{1}{3} \end{pmatrix}$$

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$$r_4 \rightarrow (1/a_{45})r_4$$

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$$r_1 \rightarrow r_1 - a_{15}r_4$$

$$r_2 \rightarrow r_2 - a_{25}r_4$$

$$r_3 \rightarrow r_3 - a_{35}r_4$$

$$\begin{pmatrix} 1 & 0 & 3 & 0 & 0 & -\frac{17}{8} \\ 0 & 1 & 2 & 0 & 0 & \frac{93}{40} \\ 0 & 0 & 0 & 1 & 0 & \frac{11}{20} \\ 0 & 0 & 0 & 0 & 1 & -\frac{1}{40} \end{pmatrix}$$

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$$\begin{cases} x_1 + 3x_3 = -\frac{17}{8} \\ x_2 + 2x_3 = \frac{93}{40} \\ x_4 = \frac{11}{20} \\ x_5 = -\frac{1}{40} \end{cases}$$

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$$\begin{cases} x_1 = -\frac{17}{8} - 3x_3 \\ x_2 = \frac{93}{40} - 2x_3 \\ x_4 = \frac{11}{20} \\ x_5 = -\frac{1}{40} \end{cases}$$

$$\begin{cases} x_1 = -\frac{17}{8} - 3t \\ x_2 = \frac{93}{40} - 2t \\ x_3 = t, t \in \mathbb{K} \\ x_4 = \frac{11}{20} \\ x_5 = -\frac{1}{40} \end{cases}$$

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