

Treppenmatrix

$$\begin{array}{cccc} & e_1 & e_2 & e_3 & & e_r \\ \left(\begin{array}{cccc} 0 \dots 0 & 1 * \dots * & 0 * \dots * & 0 * \dots * & 0 * \dots * & * \\ \vdots & 0 & 1 * \dots * & 0 * \dots * & & * \\ \vdots & 0 & 0 & 1 * & & * \\ \vdots & 0 & 0 & 0 & & * \\ \vdots & \vdots & \vdots & \vdots & & \vdots \\ \vdots & \vdots & \vdots & \vdots & & 0 * \dots * \\ \vdots & \vdots & \vdots & \vdots & & \vdots \\ \vdots & \vdots & \vdots & \vdots & & 0 * \dots * \\ \vdots & \vdots & \vdots & \vdots & & \vdots \\ \vdots & \vdots & \vdots & \vdots & & 0 * \dots * \\ \vdots & \vdots & \vdots & \vdots & & \vdots \\ \vdots & \vdots & \vdots & \vdots & & 0 * \dots * \\ \vdots & \vdots & \vdots & \vdots & & \vdots \\ 0 \dots 0 & 0 & 0 & 0 & & 0 * \dots * \end{array} \right) \\ & k_1 & k_2 & k_3 & & k_r \end{array}$$

The diagram illustrates a staircase matrix (Treppenmatrix) with columns labeled $e_1, e_2, e_3, \dots, e_r$. The matrix is enclosed in large blue parentheses. The entries are as follows:

- Column e_1 : $0 \dots 0$ (blue), followed by $1 * \dots *$ (green), then 0 (green), 0 (green), 0 (green), and 0 (green).
- Column e_2 : $0 * \dots *$ (green), $1 * \dots *$ (green), 0 (green), 0 (green), and 0 (green).
- Column e_3 : $0 * \dots *$ (green), $0 * \dots *$ (green), $1 * \dots *$ (green), 0 (green), and 0 (green).
- Column e_r : $0 * \dots *$ (green), $0 * \dots *$ (green), $0 * \dots *$ (green), $0 * \dots *$ (green), $0 * \dots *$ (green), $0 * \dots *$ (green), $1 * \dots *$ (green), $0 * \dots 0$ (green), and $0 * \dots 0$ (green).

Red annotations include a staircase line connecting the leading ones in the first three columns, a red 0 in the second column, and a red staircase line connecting the leading ones in the e_r column. Below the matrix, the labels $k_1, k_2, k_3, \dots, k_r$ are written in red.