

2.10.2 Example: Using Gauß-Jordan algorithm for matrix inversion

For the Gauß-Jordan algorithm for finding the inverse of a matrix, which is the most commonly used technique, we will give here just one example:

$$\begin{array}{ccc}
 \begin{array}{c} \mathbf{Matrix} \\ \left(\begin{array}{ccc} 1 & 0 & 1 \\ 2 & 1 & 0 \\ 3 & 0 & 1 \end{array} \right) \end{array} & & \begin{array}{c} \mathbf{Identity matrix} \\ \left(\begin{array}{ccc} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{array} \right) \end{array} \\
 & (III - I)/2 \rightarrow I & \\
 \\
 \begin{array}{c} \left(\begin{array}{ccc} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 0 & 1 \end{array} \right) \end{array} & II/2 - I \rightarrow I & \begin{array}{c} \left(\begin{array}{ccc} -\frac{1}{2} & 0 & +\frac{1}{2} \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{array} \right) \end{array} \\
 \\
 \begin{array}{c} \left(\begin{array}{ccc} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 3 & 0 & 1 \end{array} \right) \end{array} & II/2 - I \rightarrow II & \begin{array}{c} \left(\begin{array}{ccc} -\frac{1}{2} & 0 & +\frac{1}{2} \\ 1 & 1 & -1 \\ 0 & 0 & 1 \end{array} \right) \end{array} \\
 \\
 \begin{array}{c} \left(\begin{array}{ccc} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 3 & 0 & 1 \end{array} \right) \end{array} & III/3 - I \rightarrow III & \begin{array}{c} \left(\begin{array}{ccc} -\frac{1}{2} & 0 & +\frac{1}{2} \\ 1 & 1 & -1 \\ 0 & 0 & 1 \end{array} \right) \end{array} \\
 \\
 \begin{array}{c} \left(\begin{array}{ccc} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{array} \right) \end{array} & & \begin{array}{c} \left(\begin{array}{ccc} -\frac{1}{2} & 0 & +\frac{1}{2} \\ 1 & 1 & -1 \\ \frac{3}{2} & 0 & -\frac{1}{2} \end{array} \right) \end{array} \\
 \mathbf{Identity Matrix} & & \mathbf{Inverse matrix}
 \end{array}$$