Linear System Notation

Given a linear system

$$\begin{aligned} 2u + v + w &= 5 \\ 4u - 6v &= -2 \\ -2u + 7v + 2w &= 9 \end{aligned}$$

we set:

$$A = \begin{bmatrix} 2 & 1 & 1 \\ 4 & -6 & 0 \\ -2 & 7 & 2 \end{bmatrix} \text{ coefficient matrix}, \quad b = \begin{bmatrix} 5 \\ -2 \\ 9 \end{bmatrix} \text{ right hand side vector}$$

$$[A|b] = \left[\begin{array}{ccc|c} 2 & 1 & 1 & 5 \\ 4 & -6 & 0 & -2 \\ -2 & 7 & 2 & 9 \end{array}\right] \text{ augmented matrix}, \quad x = \begin{bmatrix} u \\ v \\ w \end{bmatrix} \text{ vector of unknowns}$$

Note that A is 3×3, b is 3×1, $[A|b]$ is 3×4, and x is 3×1.