

The set of linear equations:

$$a_i x_i = b_i \quad \forall i = 1, \dots, n$$

can be written as a matrix equation:

$$\text{diag}(\mathbf{a})\mathbf{x} = \mathbf{b}$$

where $\mathbf{x} = (x_1, \dots, x_n)^T$, $\mathbf{b} = (b_1, \dots, b_n)^T$ and

$$\text{diag}(\mathbf{a}) = \begin{bmatrix} a_1 & 0 & \cdots & 0 \\ 0 & a_2 & \ddots & \vdots \\ \vdots & \ddots & \ddots & 0 \\ 0 & \cdots & 0 & a_n \end{bmatrix}$$