Matrix

A square or rectangular set of numbers, usually written enclosed in a large pair of brackets. There are special rules for adding and multiplying matrices that make them useful for representing linear transformations and linear equations.

For example, the equations

$$\begin{aligned} x + 2y + 3z &= 1 \\ 2x + 5y + 7z &= 2 \\ x + 4y \qquad &= 3 \end{aligned}$$

can be represented by the single matrix equation

$$\mathbf{Ax} = \mathbf{B}$$

where

$$\mathbf{A} = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 5 & 7 \\ 1 & 4 & 0 \end{pmatrix}, \quad \mathbf{x} = \begin{pmatrix} x \\ y \\ z \end{pmatrix}, \quad \text{and} \quad \mathbf{B} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}.$$

Matrices can be used to represent many physical quantities which have multiple components in a simple but useful form. For example, the various moments of inertia that a solid has about different axes of rotation can be expressed in a single 3×3 matrix.