is a Vector Space $M_{mxn}(+,\mathbb{R})$ where the inner product (dot product) is defined as

$$\begin{aligned} < A, B >= A.B = a_{11}b_{11} + ... + a_{1n}b_{1n} \\ +a_{21}b_{21} + ... + a_{2n}b_{2n} \\ +a_{n1}b_{n1} + ... + a_{nn}b_{nn} \end{aligned}$$

and the norm of A, by $||\,A\,|| = \sqrt{A.A}$

The vector space $R^3(+,\mathbb{R})$ has the natural generalization

$$R^n(+,.,R)$$

where

$$R^n = \{(x_1, ..., x_n) : x_i \in R\}$$

is the set of all ordered n-tuples or vectors in n-space,in which the operation of addition, multiplication by scalars and inner product are defined as:

$$\begin{aligned} (x_1, ..., x_n) + (y_1, ..., y_n) = (x_1 + y_1, ..., x_n + y_n) \\ \lambda(x_1, ..., x_n) = (\lambda x_1, ..., \lambda x_n) \\ (x_1, ..., x_n).(y_1, ..., y_n) = x_1y_1 + ... + x_ny_n \end{aligned}$$

The vectors

$e_1 = (1, 0, ..., 0), e_2 = (0, 1, 0, ...0), ..., e_n = (0, ..., 0, 1)$

is this space are unit vectors and pairwise orthogonal as seen by application inner product:

$$e_i.e_j = \begin{cases} 1 \ when \ i = j \\ 0 \ when \ i \neq j \end{cases}$$

They are said to lie on $n(> 1)$ mutually orthgonal axes $0_{x_1}, ..., 0_{x_n}$ sketch of which cannot be realized when $n > 3$.