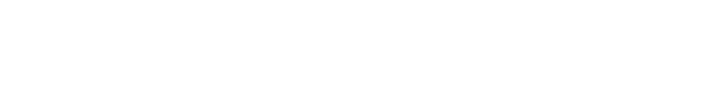# examples of vector spaces

examples of vector spaces

- Real n-dimensional space $\mathbb{R}^n$:

  The set of all n-tuples of real numbers (e.g., $\mathbb{R}^2, \mathbb{R}^3$) with standard addition and scalar multiplication
  - Example: $\vec{u} = [1,2,3], \vec{v} = [4,5,6]$ and $2\vec{u} = [2,4,6]$

- Polynomials of degree n or less P_n:

  The set of all polynomials of degree $\leq n$ with real coefficients
  - Example: $P_2 = \{a_0 + a_1 x + a_2 x^2 \mid a_0, a_1, a_2 \in \mathbb{R}\}$

- Matrices of fixed size $M_{m \times n}$:

  The set of all $m \times n$ matrices with real (or complex) entries.
  - Example: The set of 2×2 matrices $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 0 & 5 \\ 1 & -2 \end{bmatrix}$.

examples that are not vector spaces