# examples of vector spaces

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- 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 $2 \times 2$ 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