EXAMPLE

In $\mathbb{R}^3$, consider $\mathbf{a}_1 = \begin{bmatrix} 1 \\ -2 \\ -5 \end{bmatrix}$, $\mathbf{a}_2 = \begin{bmatrix} 2 \\ 5 \\ 6 \end{bmatrix}$, $\mathbf{b} = \begin{bmatrix} 7 \\ 4 \\ -3 \end{bmatrix}$.

Is it possible for $\mathbf{b}$ to be written as a linear combination of $\mathbf{a}_1$ and $\mathbf{a}_2$?

VECTOR PROPERTIES: ADDITIVE IDENTITY & ADDITIVE INVERSE

Let $\mathbf{v} \in \mathbb{R}^n$, $c \in \mathbb{R}$ (scalar)

1. The additive identity is unique.
2. The additive inverse is unique.
3. $0\mathbf{v} = \mathbf{0}$
4. $c\mathbf{0} = \mathbf{0}$
5. If $c\mathbf{v} = \mathbf{0}$, then $c = 0$ or $\mathbf{v} = \mathbf{0}$.
6. $-(-\mathbf{v}) = \mathbf{v}$

VECTOR SPACES

Section 4.2

EXAMPLE

$\mathbb{R}^2$ with the standard operations of vector addition and scalar multiplication

EXAMPLE

$\mathbb{R}^n$ (the set of all n-tuples) along with the standard operations of vector addition and scalar multiplication

EXAMPLE

The set of all 2×3 matrices, $M_{2\times 3}$, with the operations of matrix addition and scalar multiplication

EXAMPLE

The set of all polynomials of degree 2 or less (this is typically denoted by P_2)