linear combinations

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Let A denote the matrix whose columns are the vectors $\vec{v_1}, \vec{v_2}, \ldots, \vec{v_n}$.
Expressing $\vec{v} = x_1\vec{v_1} + x_2\vec{v_2} + \ldots + x_n\vec{v_n}$ as a linear combination of the given vectors is then equivalent to solving the linear system $Ax = \vec{v}$.

- Determining whether a given vector is in the linear span of a given set of vectors, and finding coefficients for linear combinations essentially means solving a system of linear equations (*we'll return to this later*)
- Because of the rules of vector addition, any such linear combination will be in the vector space.

the span