- A set of vectors $S = \{\vec{v}_1, \vec{v}_2, ..., \vec{v}_n\}$ is **linearly independent** iff
  $c_1\vec{v}_1 + c_2\vec{v}_2 + ... + c_n\vec{v}_n = \vec{0} \Rightarrow c_1 = c_2 = ... = c_n = 0$
  - Otherwise, $S$ is **linearly dependent**
  - Subsets of linearly independent sets are linearly independent
  - Supersets of linearly dependent sets are linearly dependent
- A vector $\vec{v}$ is a **linear combination** of $\vec{v}_1, \vec{v}_2, ..., \vec{v}_n$ iff $\exists c_1, c_2, ..., c_n : \vec{v} = c_1\vec{v}_1 + c_2\vec{v}_2 + ... + c_n\vec{v}_n$
  - In a linearly dependent set of vectors, there exists a vector that can be expressed as a linear combination of the other vectors
- If $\vec{0} \in S$, then $S$ is linearly dependent
- For $S \subseteq R^n$ such that $|S| = n$, $S$ is linearly independent iff $\det(A) \neq 0$, where $A$ is the matrix constructed of the vectors of $S$ as either rows or columns.
- If you put a set of vectors as columns in a matrix and then perform Gaussian elimination, then the columns with pivots correspond to a linearly independent subset
- Linear independence of functions
  - **Wronskian Determinant**. Suppose there is a set of $n$ functions $\{y_1, y_2, ..., y_n\}$, each of which are $n-1$ times differentiable on some interval $I \subseteq \mathbb{R}$. The **Wronskian Determinant** of the functions in this set is:

$$W(y_1, y_2, ..., y_n) = \begin{vmatrix} y_1 & y_2 & \cdots & y_n \\ y_1' & y_2' & \cdots & y_n' \\ \vdots & \vdots & \ddots & \vdots \\ y_1^{(n-1)} & y_2^{(n-1)} & \cdots & y_n^{(n-1)} \end{vmatrix}$$

  - If $W(x_o) \neq 0$ for some $x_o \in I$, then $\{y_1, y_2, ..., y_n\}$ is linearly independent on *I*.
  - If $\{y_1, y_2, ..., y_n\}$ is linearly dependent on *I*, then $W(x) = 0$ for all $x \in I$.