Linear Algebra

Summary of Matrices Module

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Are these 3 vectors linearly ind. ?

$$\begin{bmatrix} 1 \\ 0 \\ 1 \\ 0 \end{bmatrix} \begin{bmatrix} -1 \\ 0 \\ 1 \\ 2 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \end{bmatrix} \longrightarrow \begin{bmatrix} 1 & -1 & 0 \\ 0 & 0 & 0 \\ 1 & 1 & 1 \\ 0 & 2 & 0 \end{bmatrix}$$

translates to $\text{Rank}(A) = 3?$ $^{4 \times 3}$

- Do these N vectors (N-dim)
      form a basis?
   $\rightarrow$ lin. ind? $\quad \rightarrow \det(A) \neq 0?$

TFAE for a sq. matrix $A_{N \times N}$

- A has full rank
- A is invertible
- $\det(A) \neq 0$
- columns of A are lin. ind.
  (rows)

More Connections

- Geometry Linear Spaces
- Linear Equations
- Multi-variate Calculus