

Three Fundamental Subspace

Table for Nul A & Col A (A is $m \times n$ matrix)

• Nul A is a subspace of \mathbb{R}^n

• Nul A is defined implicitly

• It takes time to find vectors in Nul A (have to solve eqⁿ)

• There is no obvious relation b/w Nul A & entries of A

• For \vec{v} in Nul A, $A\vec{v} = \vec{0}$

• Given a specific vector \vec{v} , we can easily test whether it's in Nul A

• Nul A = $\{\vec{0}\}$ iff $A\vec{x} = \vec{0}$ has only the trivial solution

• Col A is subspace of \mathbb{R}^m

• Col A is defined explicitly

• It is easy to find vectors in Col A

• There is a direct relation b/w Col A & entries of A

• For \vec{v} in Col A, $A\vec{x} = \vec{v}$ is consistent

• Given a specific vector \vec{v} , we cannot easily test whether it's in Col A

• Col A = \mathbb{R}^m iff $A\vec{x} = \vec{v}$ has a solution for every \vec{v} in \mathbb{R}^m