Vector Space and REF

Given Vector Space V, then $W \subset V$ is a subspace if

check subspace

1. $\vec{0} \in W$
2. $\vec{w_1} + \vec{w_2} \in W$ if $\vec{w_1}, \vec{w_2} \in W$
3. $c\vec{w} \in W$ if $\vec{w} \in W$ and $c \in R$

$A = \langle \vec{v_1}, \vec{v_2}, \vec{v_3} \ldots \vec{v_n} \rangle$

$\operatorname{col} A = \langle A\vec{c} \mid \vec{c} \in R^n \rangle$

Null Space

consise of all solutions $\vec{x}$ to $A\vec{x} = \vec{0}$

$\operatorname{Nul} A = \{ \vec{x} \mid A\vec{x} = \vec{0} \}$

REF (row-echelon form) $\begin{cases} \text{all zero rows beneath other rows} \\ \text{All pivot must lie to right of any pivot above it} \end{cases}$

pivot column : a column exactly 1 pivot

free column : a column with no pivot

e.g. $\begin{bmatrix} 1 & 0 & -1 & 1 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$ pivot

---

Reduced row-echelon form (RREF)

1. get REF
2. make pivot 1
3. make element above pivot 0