MATH 129A (8) **SPRING 2017** **QUIZ 9**

Extra credit

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5pts

5 pts. Let $A = \begin{bmatrix} -6 & 12 \\ -3 & 6 \end{bmatrix}$ and $\mathbf{w} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$. Determine if **w** is in Col A. Is **w** in Nul A?

If $\vec{w} \in \text{Nul } A$ then $A\vec{w} = \vec{0}$

$$\begin{bmatrix} -6 & 12 \\ -3 & 6 \end{bmatrix}\begin{bmatrix} 2 \\ 1 \end{bmatrix} = \begin{bmatrix} (-6)(2)+(12)(1) \\ (-3)(2)+(6)(1) \end{bmatrix} = \begin{bmatrix} -12+12 \\ -6+6 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} = \vec{0}$$ – Yes in Nullspace

$\vec{w} \in \text{Nul } A$

If $\vec{w} \in \text{Col } A$, $\vec{w}$ is a linear combination of the columns of A.

$$\begin{bmatrix} -6 & 12 \\ -3 & 6 \end{bmatrix}\begin{bmatrix} -\frac{1}{3} \\ 0 \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \end{bmatrix} \Rightarrow \vec{w} \in \text{Col } A$$ Yes in column space

You can also row reduce the augmented matrix and show its consistent

$$\begin{bmatrix} -6 & 12 & 2 \\ -3 & 6 & 1 \end{bmatrix} \underset{R_2 = R_2 - \frac{1}{2}R_1}{\sim} \begin{bmatrix} -6 & 12 & 2 \\ 0 & 0 & 0 \end{bmatrix}$$ Consistent