Name: _____ Sort #: _____

Worksheet 11

Dimension & Rank MATH 2250, Fall 2018

1. Find the dimension of the subspace spanned by the vectors

$$\left\{ \begin{bmatrix} 1 \\ -2 \\ 0 \end{bmatrix}, \begin{bmatrix} -3 \\ 4 \\ 1 \end{bmatrix}, \begin{bmatrix} -8 \\ 6 \\ 5 \end{bmatrix}, \begin{bmatrix} -3 \\ 0 \\ 7 \end{bmatrix} \right\}$$

2. Determine the dimensions of Null(A) and Col(A) for the matrix

$$A = \begin{bmatrix} 1 & 3 & -4 & 2 & -1 & 6 \\ 0 & 0 & 1 & -3 & 7 & 0 \\ 0 & 0 & 0 & 1 & 4 & -3 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

Be sure to clearly explain how you acheived your result.

3. Suppose $A \in \mathbb{R}^{6\times 3}$ has rank 3 find $\dim(\text{Null}(A))$, $\dim(\text{Row}(A))$ and rank $A^\top$.

4. Given

$$A = \begin{bmatrix} 1 & -3 & 4 & -1 & 9 \\ -2 & 6 & -6 & -1 & -10 \\ -3 & 9 & -6 & -6 & -3 \\ 3 & -9 & 4 & 9 & 0 \end{bmatrix}; \qquad B = \begin{bmatrix} 1 & -3 & 0 & 5 & -7 \\ 0 & 0 & 2 & -3 & 8 \\ 0 & 0 & 0 & 0 & 5 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

assume A is row equivalent to B. Find $\text{Rank}(A)$ and $\dim(\text{Null}(A))$ and find bases for $\text{Col}(A)$, $\text{Row}(A)$, and $\text{Null}(A)$. Be sure to clearly explain how you acheived your results.