Score:

Name: Solutions
Period (circle one): 1 2 3 4 5 6
Team (circle one): a b c d e f

SM 261 – Matrix Algebra – Quiz 17
Section 4.2 – Column and Null Spaces

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

1. Find the basis of Col A.

$x_1\ x_2\ x_3\ x_4\ x_5$

$rref(A) = \begin{bmatrix} 1 & 0 & 2.8 & 1 & 3.8 \\ 0 & 1 & -1.6 & 1 & -1.6 \end{bmatrix}$

(pivots)

$\therefore$ basis Col A $= \left\{ \begin{bmatrix} 1 \\ 2 \end{bmatrix}, \begin{bmatrix} 3 \\ 1 \end{bmatrix} \right\}$

2. Find the basis of Nul A.

$x_1 + 2.8x_3 + x_4 + 3.8x_5 = 0 \Rightarrow x_1 = -2.8x_3 - x_4 - 3.8x_5$

$x_2 - 1.6x_3 + x_4 - 1.6x_5 = 0 \qquad x_2 = 1.6x_3 - x_4 + 1.6x_5$

$\vec{x} = x_3 \begin{bmatrix} -2.8 \\ 1.6 \\ 1 \\ 0 \\ 0 \end{bmatrix} + x_4 \begin{bmatrix} -1 \\ -1 \\ 0 \\ 1 \\ 0 \end{bmatrix} + x_5 \begin{bmatrix} -3.8 \\ 1.6 \\ 0 \\ 0 \\ 1 \end{bmatrix} \Rightarrow$ basis Nul $A = \left\{ \begin{bmatrix} -2.8 \\ 1.6 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} -1 \\ -1 \\ 0 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} -3.8 \\ 1.6 \\ 0 \\ 0 \\ 1 \end{bmatrix} \right\}$

3. Finish the following statement based in your answers to 1 and 2:

(The Number of Vectors in the Basis of Col A) +
(The Number of Vectors in the Basis of Nul A) =
???

$2 + 3 = 5$ ← NUMBER OF COLUMNS IN A