# *Homework* **Sec 2.9**

**1.** Given the matrix $\begin{pmatrix} 0 & -2 \\ 1 & -3 \end{pmatrix}$

***a)*** Write row vectors
***b)*** Write Column vectors

**2.** Find a basis for the row space and the rank of the matrix $\begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix}$

**3.** Find a basis for the row space and the rank of the matrix $\begin{pmatrix} 1 & 6 & 18 \\ 7 & 40 & 116 \\ -3 & -12 & -27 \end{pmatrix}$

**4.** Find the nullspace of the matrix $A = \begin{pmatrix} 2 & -1 \\ -6 & 3 \end{pmatrix}$

**5.** Find the nullspace of the matrix $A = \begin{pmatrix} 1 & 2 & -3 \\ 2 & -1 & 4 \\ 4 & 3 & -2 \end{pmatrix}$

**6.** Find the nullspace of the matrix $A = \begin{pmatrix} 5 & 2 \\ 3 & -1 \\ 2 & 1 \end{pmatrix}$

**7.** For $A = \begin{bmatrix} 1 & 2 & 1 & 0 & 0 \\ 2 & 5 & 1 & 1 & 0 \\ 3 & 7 & 2 & 2 & -2 \\ 4 & 9 & 3 & -1 & 4 \end{bmatrix} \xrightarrow{rref} B = \begin{bmatrix} 1 & 0 & 3 & 0 & -4 \\ 0 & 1 & -1 & 0 & 2 \\ 0 & 0 & 0 & 1 & -2 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

***a)*** Find the rank and nullity of $A$.

***b)*** Find the basis of the nullspace of $A$.

***c)*** Find the basis of the row space of $A$.

***d)*** Find the basis of the column space of $A$.

***e)*** Determine whether the rows of $A$ are linearly independent.

***f)*** Let the columns of $A$ denoted by $a_1,\ a_2,\ a_3,\ a_4,\ and\ a_5$.

Determine whether each set is linearly independent

*i)* $\{a_1, a_2, a_4\}$ *ii)* $\{a_1, a_2, a_3\}$ *iii)* $\{a_1, a_3, a_5\}$

**8.** Determine whether the nonhomogeneous system $Ax = b$ is consistent. If it is, write the solution in the form $x = x_p + x_h$.

$$\begin{cases} x - 4y = 17 \\ 3x - 12y = 51 \\ -2x + 8y = -34 \end{cases}$$