MT1004 – Linear Algebra
Homework # 4

Question # 1

Either show that the given set, H, is a vector space, or find a specific example to the contrary, where a, b and c are any real numbers.

i) $H = \left\{ \begin{bmatrix} a \\ b \\ c \end{bmatrix} : a + b + c = 0 \right\}$

ii) $H = \left\{ \begin{bmatrix} a \\ b \\ c \end{bmatrix} : a + b + c = 1 \right\}$

iii) $H = \left\{ \begin{bmatrix} a - 2b \\ c \end{bmatrix} \right\}$

iv) $H = \left\{ \begin{bmatrix} a - 2 \\ c \end{bmatrix} \right\}$

Question # 2

Let $A = \begin{bmatrix} 1 & -3 & 2 & 0 \\ 0 & 0 & 3 & 0 \end{bmatrix}$.

i)   Is $\begin{bmatrix} 1 \\ -1 \\ 0 \\ 1 \end{bmatrix}$ in Col A? Is $\begin{bmatrix} 1 \\ -1 \\ 0 \\ 1 \end{bmatrix}$ in Nul A ?

ii)   Is $\begin{bmatrix} 1 \\ -1 \end{bmatrix}$ in Col A? Is $\begin{bmatrix} 1 \\ -1 \end{bmatrix}$ in Nul A ?

iii)   Find the vectors that span Nul A.