Math 4A Week 6 – November 10, 2014

1. Given A, find the basis of the null space.

$$A = \begin{bmatrix} 3 & 8 & 0 & 0 & 0 \\ 0 & 0 & 5 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

2. Given B, find the basis of the column space.

$$B = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 5 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 3 & 8 & 0 & 0 & 0 \end{bmatrix}$$

3. Write $\begin{pmatrix} 3 \\ 4 \\ 5 \\ 6 \end{pmatrix}$ in terms of the standard basis.

4. What is the dimension of W? Is W a subspace? If so, what is it a subspace of?

$$W = span\{\begin{pmatrix} 1 \\ 2 \\ 3 \\ 4 \end{pmatrix}, \begin{pmatrix} 5 \\ 6 \\ 7 \\ 8 \end{pmatrix}, \begin{pmatrix} 11 \\ 14 \\ 17 \\ 20 \end{pmatrix}, \begin{pmatrix} 7 \\ 10 \\ 13 \\ 16 \end{pmatrix}\}$$

5. Given the basis $\mathcal{B} = \{\begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}, \begin{pmatrix} 0 \\ 2 \\ 3 \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}\}$, and vector $v = \begin{pmatrix} a \\ b \\ c \end{pmatrix}$,

   (i). write the change-of-coordinates matrix $P_{\mathcal{B}}$, the e-coordinates of v, $\mathcal{B}$-coordinates of v,

   (ii). explain what the equation $v = P_{\mathcal{B}}[v]_{\mathcal{B}}$ is doing.