HOMEWORK ASSIGNMENT 3

Name: **Due:** Wednesday February 6, 4PM

Problem 1:

Find a basis for the following three subspaces of $\mathbb{R}^4$:

1. The subspace of vectors (x, y, z, w) such that $x = y = z = w$.
2. The subspace of vectors (x, y, z, w) such that $x + y + z + w = 0$.
3. The subspace of vectors (x, y, z, w) which are perpendicular to both $(1, 0, 1, 1)$ and $(1, 0, 0, 1)$.

Problem 2:

Suppose that the only information you have about a matrix B is that its dimensions are 4×5 and it has rank 2. Compute $\dim N(B) - \dim N(B^T) + \dim C(B) - \dim C(B^T)$. Explain how you got your answer.

Problem 3:

Find the largest possible number of independent vectors among

$$\vec{v}_1 = \begin{bmatrix} 1 \\ -1 \\ 0 \\ 0 \end{bmatrix} \quad \vec{v}_2 = \begin{bmatrix} 1 \\ 0 \\ -1 \\ 0 \end{bmatrix} \quad \vec{v}_3 = \begin{bmatrix} 1 \\ 0 \\ 0 \\ -1 \end{bmatrix} \quad \vec{v}_4 = \begin{bmatrix} 0 \\ 1 \\ -1 \\ 0 \end{bmatrix} \quad \vec{v}_5 = \begin{bmatrix} 0 \\ 1 \\ 0 \\ -1 \end{bmatrix} \quad \vec{v}_6 = \begin{bmatrix} 0 \\ 0 \\ 1 \\ -1 \end{bmatrix}$$

Next, calculate $\dim Span(\vec{v}_1, \vec{v}_2, \vec{v}_3, \vec{v}_4, \vec{v}_5, \vec{v}_6)$

Problem 4: Challenge Problems from the zyBook

All challenge activities in 3.6, 3.7, 3.8, and 3.9 of the zyBook. These are not optional.

Problem 5:

Read Chapter 4 from the zyBook and do all of the participation exercises therein. Which concept was most confusing for you?