Homework III

Due: Oct. 16. (Fri) 23:59 PM

I. REMARK

- Reading materials: Ch 2.8-3.3 in the textbook.
- Don't write just an answer. Please describe enough processes to justify your answer (Korean is also OK!!).
- Check the due date!!!
- The midterm exam will cover Ch 1.1-3.3.
- Our greatest weakness lies in giving up. The most certain way to succeed is to try just one more time.

II. PROBLEM SET

1) Find a basis for Col A and a basis for Nul A. What is Rank A?

$$A = \begin{bmatrix} 4 & 5 & 9 & -2 \\ 6 & 5 & 1 & 12 \\ 3 & 4 & 8 & -3 \end{bmatrix}$$

2) Justify whether H is a subspace of $\mathbb{R}^3$ or not. If it is, what is the dimension of the subspace?

$$H = span\{ \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 2 \\ 4 \\ 6 \end{bmatrix}, \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix} \}$$

3) Is $\mathbf{p}$ in Col A? Is $\mathbf{p}$ in Nul A? Why or why not?

$$A = \begin{bmatrix} 2 & -3 & -4 \\ -8 & 8 & 6 \\ 6 & -7 & -7 \end{bmatrix}, \mathbf{p} = \begin{bmatrix} 6 \\ -10 \\ 11 \end{bmatrix},$$

4) Construct a 4×3 matrix with rank 1.

5) Find the coordinate vector $[\mathbf{x}]_C$.

$$B = \{ \begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 2 \\ -1 \end{bmatrix} \}, C = \{ \begin{bmatrix} 3 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix} \}, [\mathbf{x}]_B = \begin{bmatrix} 3 \\ 2 \end{bmatrix},$$

6) Find the determinant of $(A^{-1})^T$

$$A = \begin{bmatrix} 6 & 3 & 2 & 4 & 0 \\ 9 & 0 & -4 & 1 & 0 \\ 8 & -5 & 6 & 7 & 1 \\ 2 & 0 & 0 & 0 & 0 \\ 4 & 2 & 3 & 2 & 0 \end{bmatrix}$$

7) Use Cramer's rule to compute the solutions of the system

$$x_1 + x_2 = 3$$
$$-3x_1 + 2x_3 = 0$$
$$x_2 - 2x_3 = 2$$