Linear Algebra
Assignment 2   MATH 2318 (Fall 2022)

Deadline: Friday September 9th, 11:59pm.

Policy to turn in assignment:

- Assignment should be submitted via BlackBoard.

- Student needs to turn in their assignment as a single PDF file.

- No email or late submission will be accepted.

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4 points   1. Let

$$
\left[\begin{array}{ccccc|c}
0 & 3 & -6 & -4 & -3 & -5 \\
-1 & 3 & -10 & -4 & -4 & -2 \\
2 & -6 & 20 & 2 & 8 & -8
\end{array}\right]
$$

be the augmented matrix of a system of linear equations. Bring the matrix to REF and identify the pivots. Is the system consistent? Explain. If it is consistent, identify basic variables, free variables (if any) and write down the solution to the linear system.

6 points   2. Let $\vec{x} = \begin{bmatrix} 1 \\ 0 \\ 1 \\ 1 \end{bmatrix}$, $\vec{y} = \begin{bmatrix} 1 \\ 1 \\ 0 \\ 1 \end{bmatrix}$, and $\vec{z} = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 0 \end{bmatrix}$. For each of the following, determine if the given vector can be written as a linear combination of $\vec{x}, \vec{y}, \vec{z}$. If so, then find the corresponding weights.

     a) $\vec{p} = \begin{bmatrix} 4 \\ 2 \\ 1 \\ 5 \end{bmatrix}$

     b) $\vec{q} = \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix}$

2 points   3. Let $\vec{v}_1 = \begin{bmatrix} 1 \\ 0 \\ -2 \end{bmatrix}$, $\vec{v}_2 = \begin{bmatrix} -3 \\ 1 \\ 8 \end{bmatrix}$, and $\vec{y} = \begin{bmatrix} h \\ -5 \\ -3 \end{bmatrix}$. For what values of h is $\vec{y}$ in Span$\{\vec{v}_1, \vec{v}_2\}$?