

California State University Northridge	College of Engineering and Computer Science Mechanical Engineering Department Mechanical Engineering 501A Seminar in Engineering Analysis
	Fall 2017 Ticket: 15966 Instructor: Larry Caretto

September 13 Homework Problems

- Are all ordered polynomials in x , of degree not exceeding three, a vector space or not? If they are find the dimension and basis.
- Show that the vectors $[2 \ 0 \ 3 \ 0 \ 8]^T$ and $[3 \ 2 \ -2 \ 4 \ 0]^T$ are orthogonal.
- Find all vectors, v , orthogonal to $a = [1 \ 2 \ 0]^T$. Do they form a vector space?
- Solve the following set of equations using Gauss elimination or indicate if no solution exists.

$$\begin{array}{rcl}
 10x + 4y - 2z & = & -4 \\
 -3w - 17x + y + 2z & = & 2 \\
 w + x + y & = & 6 \\
 8w - 34x + 16y - 10z & = & 4
 \end{array}$$

- Are the vectors $[2 \ -4]$, $[1 \ 9]$, and $[3 \ 5]$ linearly dependent or independent?
- Find the rank of the matrix at the right.

$$\begin{bmatrix} 8 & -4 \\ -2 & 1 \\ 6 & -3 \end{bmatrix}$$

- Find the rank of the matrix at the right.

$$\begin{bmatrix} 3 & 1 & 4 \\ 0 & 5 & 8 \\ -3 & 4 & 4 \\ 1 & 2 & 4 \end{bmatrix}$$

- Find the basis for the row space and the column space for the matrix in problem 7, immediately above.
- Solve the system of equations shown below by Cramer's rule and check by Gauss elimination.

$$\begin{array}{rcl}
 3x + 7y + 8z & = & -13 \\
 2x & + & 9z = -5 \\
 -4x + y - 26z & = & 2
 \end{array}$$