

Matrix Algebra
Span
Extra Homework 9

For each of the following, determine if w is in the span of v_1, \dots, v_n . Also determine if v_1, \dots, v_n are linearly dependent or linearly independent.

1. $v_1 = \begin{pmatrix} 1 \\ 1 \\ 1 \\ 0 \end{pmatrix}, v_2 = \begin{pmatrix} 1 \\ 2 \\ 3 \\ 1 \end{pmatrix}$ and $w = \begin{pmatrix} 2 \\ 1 \\ 2 \\ 1 \end{pmatrix}$

Answer: w is not in the span of v_1, v_2 . The vectors v_1, v_2 are linearly independent.

2. $v_1 = \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \end{pmatrix}, v_2 = \begin{pmatrix} 1 \\ 2 \\ 2 \\ 1 \end{pmatrix}, v_3 = \begin{pmatrix} 3 \\ 1 \\ 1 \\ 3 \end{pmatrix}$ and $w = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 1 \end{pmatrix}$

Answer: w is in the span of v_1, v_2, v_3 . The vectors v_1, v_2, v_3 are linearly independent.

3. $v_1 = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}, v_2 = \begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix}, v_3 = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$ and $w = \begin{pmatrix} 2 \\ 4 \\ 0 \end{pmatrix}$.

Answer: w is in the span of v_1, v_2, v_3 . The vectors v_1, v_2, v_3 are not linearly independent.