Homework 22, Section 4.4: 17, 18, 23, 27

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Homework

17.

$0V_1 - XV_2 - XV_3$

18.

$b_1 = 1 * b_1 + 0 * b_k + ... + 0 * b_n$ so the B coordinate vector of b_1 is $\begin{bmatrix} 1 \\ 0 \\ ... \\ 0 \end{bmatrix} = e_1$

23.

Suppose that $[u]_b = [w]_b = \begin{bmatrix} c_1 \\ ... \\ c_n \end{bmatrix}$. By the definition of coordinate vectors $u - w = c_1 b_1 + ... + c_n b_n$. Since u and w are arbitrary elements of V the coordinate mapping is one to one.

27.

The coordinate mapping produces the coordinate vectors $(1, 0, 0, 1), (3, 1, -2, 0,), (0, -1, 3, -1)$ respectively. We now test for linear independence.

The RREF is $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$

Since the matrix has a pivot in each columns, it's columns (and thus the polynomials) are linearly independent.