

Score:

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SM 261 – Matrix Algebra – Quiz 18
Section 4.4 – Coordinates

Let $\vec{x} = \begin{bmatrix} 6 \\ 7 \end{bmatrix} \in V$ where V is a vector space.

1. Find $[\vec{x}]_B$ if the basis for V is $B = \left\{ \begin{bmatrix} 1 \\ 2 \end{bmatrix}, \begin{bmatrix} 4 \\ 3 \end{bmatrix} \right\}$

$$\text{rref} \left(\begin{bmatrix} 1 & 4 & 6 \\ 2 & 3 & 7 \end{bmatrix} \right) = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 1 \end{bmatrix}$$
$$\therefore [\vec{x}]_B = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$$

2. Find $[\vec{x}]_B$ if the basis for V is $B = \left\{ \begin{bmatrix} 2 \\ 5 \end{bmatrix}, \begin{bmatrix} 1 \\ 3 \end{bmatrix} \right\}$

$$\text{rref} \left(\begin{bmatrix} 2 & 1 & 6 \\ 5 & 3 & 7 \end{bmatrix} \right) = \begin{bmatrix} 1 & 0 & 11 \\ 0 & 1 & -16 \end{bmatrix}$$
$$[\vec{x}]_B = \begin{bmatrix} 11 \\ -16 \end{bmatrix}$$

3. Find $[\vec{x}]_B$ if the basis for V is $B = \left\{ \begin{bmatrix} 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \end{bmatrix} \right\}$

$$[\vec{x}]_B = \begin{bmatrix} 6 \\ 7 \end{bmatrix}$$

Recall: $[\vec{x}]_B$ contains the coordinates of \vec{x} .