## **Concept Review**

- Vector Space
- Closure under Addition.
- Closure under Scalar Multiplication.
- Examples of Vector Space.

## Skills

- Determine whether a given set with two operations is a vector space.
- Show that a set with two operations is not a vector space by demonstrating that at least that one of the vector space axioms fails. .

1. Let

$$W = \{(x,1) : x \in \mathbb{R}\}.$$

Show that W is not a vector space.

2. Let

$$W = \left\{ \begin{bmatrix} a & b \\ 2 & c \end{bmatrix}, a, b, c \in \mathbb{R} \right\}.$$

Is W a vector space under usual addition and scalar multiplication of matrices.

3. Let

$$W = \left\{ \begin{bmatrix} a & b \\ c & a \end{bmatrix}, a, b, c \in \mathbb{R} \right\}.$$

Is W a vector space under usual addition and scalar multiplication of matrices.

4. Let

$$W = \left\{ \begin{bmatrix} a & a & a \\ b & b & b \end{bmatrix}, a, b \in \mathbb{R} \right\}.$$

Is W a vector space under usual addition and scalar multiplication of matrices.