Scalar Multiplication Axioms :-

6. $ku \in V$ closure under Multiplication.

7. $k(u+v) = ku + kv$ Distributive

8. $(k+c)u = ku + cu$ Distributive

9. $(kc)u = k(cu)$ Associative.

10. $1 \cdot u = u$ (Scalar Identitey)

Question Is the set of all vector in R^2 of the form $\begin{bmatrix} x \\ x \end{bmatrix}$ with the usual defination of vector Addition and Multiplication in a vector space ?

Solution:

$$u = \begin{bmatrix} x \\ x \end{bmatrix}, \quad v = \begin{bmatrix} y \\ y \end{bmatrix}, \quad w = \begin{bmatrix} z \\ z \end{bmatrix}$$

1. $$u + v = \begin{bmatrix} x \\ x \end{bmatrix} + \begin{bmatrix} y \\ y \end{bmatrix} = \begin{bmatrix} x+y \\ x+y \end{bmatrix} \in V$$

2. $$u + v = v + u$$

$$u+v = \begin{bmatrix} x+y \\ x+y \end{bmatrix} = \begin{bmatrix} y+x \\ y+x \end{bmatrix} = v+u \in V$$