$$u+(-u)=\begin{bmatrix} a_1-a_1 & 0 \\ 0 & b_1-b_1 \end{bmatrix}$$

$$u+(-u)=\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

Hence, for every $u \in V$ there is an inverse element $-u \in V$.

Axioms 06

$ku \in V$

Let k is any scalar in R then ku is also be in R.

$$ku = k\begin{bmatrix} a_1 & 0 \\ 0 & b_1 \end{bmatrix} = \begin{bmatrix} ka_1 & 0 \\ 0 & kb_1 \end{bmatrix}$$

Hence, Axiom 6 satisfied in V, because $u \in V$ and k is any scalar then $ku \in V$.

Axioms 07

Let k is scalar, show that $k(u+v)=ku+kv$

$$k(u+v) = k\left(\begin{bmatrix} a_1 & 0 \\ 0 & b_1 \end{bmatrix} + \begin{bmatrix} a_2 & 0 \\ 0 & b_2 \end{bmatrix}\right)$$