$$u+v = \begin{bmatrix} a_1+a_2 & 0 \\ 0 & b_1+b_2 \end{bmatrix}$$

$$= \begin{bmatrix} a_2+a_1 & 0 \\ 0 & b_2+b_1 \end{bmatrix}$$

$$= \begin{bmatrix} a_2 & 0 \\ 0 & b_2 \end{bmatrix} + \begin{bmatrix} a_1 & 0 \\ 0 & b_1 \end{bmatrix}$$

$$= v + u$$

$$\boxed{u+v = v+u}$$

Hence Axioms (2) is satisfied.

Axioms 03:

The next Axioms is Associative

If $u, v, w \in V$

$$u+(v+w) = (u+v)+w$$

$$u+(v+w) = \begin{bmatrix} a_1 & 0 \\ 0 & b_1 \end{bmatrix} + \left(\begin{bmatrix} a_2 & 0 \\ 0 & b_2 \end{bmatrix} + \begin{bmatrix} a_3 & 0 \\ 0 & b_3 \end{bmatrix} \right)$$

$$= \begin{bmatrix} a_1 & 0 \\ 0 & b_1 \end{bmatrix} + \begin{bmatrix} a_2+a_3 & 0 \\ 0 & b_2+b_3 \end{bmatrix}$$

$$= \begin{bmatrix} a_1+a_2+a_3 & 0 \\ 0 & b_1+b_2+b_3 \end{bmatrix}$$