3. $\underset{\sim}{u} = \begin{pmatrix} 0 \\ 1 \\ 2 \end{pmatrix}$ $\underset{\sim}{v} = (1 \quad 2 \quad b)$

$\underset{\sim}{v} \cdot \underset{\sim}{u} = 1\times 0 + 2\times 1 + b\times 2 = 2 + 2b$

$$\underset{\sim}{u}\,\underset{\sim}{v} = \begin{pmatrix} 0 & 0 & 0 \\ 1 & 2 & b \\ 2 & 4 & 2b \end{pmatrix}$$

4. A^2 does not exist

$$AB = \begin{pmatrix} 4 & 4 & 8 & 6 \\ 10 & 10 & 16 & 15 \end{pmatrix}$$

AC does not exist

$$CA = \begin{pmatrix} 9 & 12 & 15 \\ 3 & 6 & 9 \\ 4 & 5 & 6 \\ 9 & 12 & 15 \end{pmatrix}$$

B^2 does not exist

$$BC = \begin{pmatrix} 1 & 3 \\ 9 & 6 \\ 1 & 4 \end{pmatrix}$$

CB does not exist

C^2 does not exist