Step-1

Given that $A_1 = \begin{pmatrix} 0 & 2 \\ 3 & 0 \end{pmatrix}$

We know that $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$

$$\Rightarrow A^{-1} = \frac{1}{ad - bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$$

$$A_1 = \begin{pmatrix} 0 & 2 \\ 3 & 0 \end{pmatrix}$$

$$\Rightarrow A_1^{-1} = \frac{1}{0(0) - 3(2)}\begin{pmatrix} 0 & -2 \\ -3 & 0 \end{pmatrix}$$

$$\Rightarrow A_1^{-1} = \frac{1}{-6}\begin{pmatrix} 0 & -2 \\ -3 & 0 \end{pmatrix}$$

$$= \boxed{\begin{pmatrix} 0 & \frac{1}{3} \\ \frac{1}{2} & 0 \end{pmatrix}}$$

Step-2

Given that $A_2 = \begin{pmatrix} 2 & 0 \\ 4 & 2 \end{pmatrix}$

$$A_2 = \begin{pmatrix} 2 & 0 \\ 4 & 2 \end{pmatrix}$$

$$\Rightarrow A_2^{-1} = \frac{1}{2.2 - 4.0}\begin{pmatrix} 2 & 0 \\ -4 & 2 \end{pmatrix}$$

$$\Rightarrow A_2^{-1} = \frac{1}{4}\begin{pmatrix} 2 & 0 \\ -4 & 2 \end{pmatrix}$$

$$= \boxed{\begin{pmatrix} \frac{1}{2} & 0 \\ -1 & \frac{1}{2} \end{pmatrix}}$$

Step-3

Given that $A_3=\begin{pmatrix}\cos\theta & -\sin\theta\\ \sin\theta & \cos\theta\end{pmatrix}$

$$A_3=\begin{pmatrix}\cos\theta & -\sin\theta\\ \sin\theta & \cos\theta\end{pmatrix}$$

$$\Rightarrow A_3^{-1}=\frac{1}{\cos\theta.\cos\theta+\sin\theta.\sin\theta}\begin{pmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{pmatrix}$$

$$\Rightarrow A_3^{-1}=\boxed{\begin{pmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{pmatrix}}\quad\left(\because\ \sin^2\theta+\cos^2\theta=1\right)$$