Step-1

Given that $J = \begin{bmatrix} c & 1 \\ 0 & c \end{bmatrix}$

$$J^2 = \begin{bmatrix} c & 1 \\ 0 & c \end{bmatrix}\begin{bmatrix} c & 1 \\ 0 & c \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} c^2 & 2c \\ 0 & c^2 \end{bmatrix}$$

$$J^3 = \begin{bmatrix} c^2 & 2c \\ 0 & c^2 \end{bmatrix}\begin{bmatrix} c & 1 \\ 0 & c \end{bmatrix}$$

$$= \begin{bmatrix} c^3 & 3c^2 \\ 0 & c^3 \end{bmatrix}$$

Step-2

Similarly, $J^4 = \begin{bmatrix} c^4 & 4c^{4-1} \\ 0 & c^4 \end{bmatrix}$ and so on.

In view of mathematical induction, we can say $J^k = \begin{bmatrix} c^k & kc^{k-1} \\ 0 & c^k \end{bmatrix}$

Substitute $k = 0$

$$\Rightarrow J^0 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Also, substituting $k = -1$, we get $J^{-1} = \begin{bmatrix} \frac{1}{c} & \frac{-1}{c^2} \\ 0 & \frac{1}{c} \end{bmatrix}$