

Matrices – Q16: General [Problem/E](2/6/21)

Find k such that $\begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$ and $\begin{pmatrix} 5 & 9 \\ 6 & k \end{pmatrix}$ commute.

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Solution

$$\begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix} \begin{pmatrix} 5 & 9 \\ 6 & k \end{pmatrix} = \begin{pmatrix} 23 & 9 + 3k \\ 34 & 18 + 4k \end{pmatrix}$$

$$\begin{pmatrix} 5 & 9 \\ 6 & k \end{pmatrix} \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix} = \begin{pmatrix} 23 & 51 \\ 6 + 2k & 18 + 4k \end{pmatrix}$$

Then $34 = 6 + 2k$, so that $k = 14$

And $9 + 3k = 51$, so that $k = 14$ also.