

We can find real numbers b and d satisfying $h = -d - b$ and $k = d - b$, hence

$$V = \begin{pmatrix} e^{-i(b+d)} \cos c & -e^{i(d-b)} \sin c \\ e^{i(b-d)} \sin c & e^{i(b+d)} \cos c \end{pmatrix} = \begin{pmatrix} e^{-ib} & 0 \\ 0 & e^{ib} \end{pmatrix} \begin{pmatrix} \cos c & -\sin c \\ \sin c & \cos c \end{pmatrix} \begin{pmatrix} e^{-id} & 0 \\ 0 & e^{id} \end{pmatrix},$$

which proves the claim. ■