$$\begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$$

$$\begin{pmatrix} -i & 0 \\ 0 & -i \end{pmatrix}$$

$$\begin{pmatrix} i & 0 \\ 0 & i \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

$$\begin{pmatrix} -3^{-m/2} & -2\,\mathrm{Sinh}\left[\frac{1}{2}\,m\,\mathrm{Log}[3]\right] \\ -3^{-m/2} & 3^{-m/2} \end{pmatrix}$$

$$\begin{pmatrix} -i\,3^{-m/2} & -2\,i\,\mathrm{Sinh}\left[\frac{1}{2}\,m\,\mathrm{Log}[3]\right] \\ -i\,3^{-m/2} & i\,3^{-m/2} \end{pmatrix}$$

$$\begin{pmatrix} i\,3^{-m/2} & 2\,i\,\mathrm{Sinh}\left[\frac{1}{2}\,m\,\mathrm{Log}[3]\right] \\ i\,3^{-m/2} & -i\,3^{-m/2} \end{pmatrix}$$

$$\begin{pmatrix} 3^{-m/2} & 2\,\mathrm{Sinh}\left[\frac{1}{2}\,m\,\mathrm{Log}[3]\right] \\ 3^{-m/2} & -3^{-m/2} \end{pmatrix}$$