



$$\begin{aligned}
 \rho &= \frac{1}{2} \left(I + n_x \sigma^x + n_y \sigma^y + n_z \sigma^z \right) \\
 &= \frac{1}{2} \begin{pmatrix} 1 + n_z & n_x - i n_y \\ n_x + i n_y & 1 - n_z \end{pmatrix}
 \end{aligned}$$