

1. Derive the eigenvalues and corresponding normalized eigenvectors of S_y given in the equations below:

$$|\nearrow\rangle = \frac{1}{\sqrt{2}} \begin{pmatrix} 1 \\ i \end{pmatrix}, (+y \text{ direction})$$

$$|\searrow\rangle = \frac{1}{\sqrt{2}} \begin{pmatrix} 1 \\ -i \end{pmatrix}, (-y \text{ direction})$$