

**Homework Problem 3.6**

A good example of a non-normal operator is the qubit raising operator

$$\sigma_+ = \frac{1}{2}(\sigma_x + i\sigma_y) \leftrightarrow \begin{pmatrix} 0 & 1 \\ 0 & 0 \end{pmatrix} .$$

- (a) *Find* the eigenvectors and eigenvalues of  $\sigma_+$ .
- (b) *Find* the polar decomposition of  $\sigma_+$ . What is the relationship between the polar decomposition and the eigenvectors and eigenvalues?