3.6.
$$G_{\pm} = \frac{1}{2}(G_{x} \pm iG_{y})$$
 $G_{+} = 10 \times 1 = \begin{pmatrix} 0 & 1 \\ 0 & 0 \end{pmatrix}$

$$G_{-} = G_{+} = 11 \times 0 = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$$

$$G_{-} = G_{+} = 11 \times 1 = \frac{1}{2}(1 - G_{\pm}) = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$$

$$G_{-} = G_{+} = 11 \times 1 = \frac{1}{2}(1 - G_{\pm}) = \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix}$$

$$\begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} p \\ p \end{pmatrix} = y \begin{pmatrix} p \\ q \end{pmatrix}$$

Eigenvalues:
$$0 = \det \begin{pmatrix} -\lambda & 1 \\ 0 - \lambda \end{pmatrix} = \lambda^2 \Rightarrow \lambda = 0$$

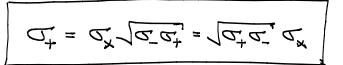
Eigenvectors: b= / a = 0, a orbitery, choose a=1

of has one eigenvalue $\lambda=0$ and one eigenvector $|e\rangle=|o\rangle$. A vector $abo\rangle+b|\pm\rangle$ is mapped to $b|o\rangle$ by of and so can be an eigenvector only if b=0.

(b) The singular values of of are the eigenvalues of of or of = 11×11 or of = 10×01. Thus the singular values are 0 and 1. The polar decomposition is

U is the unitary matrix that maps the eigenvectors of $\sigma_{L}\sigma_{L}$ to the eigenvectors of $\sigma_{L}\sigma_{L}$. This is equivalent to saying that $N\sigma_{L}\sigma_{L}U = \sigma_{L}\sigma_{L}$. Thus U is the unitary that exchanges 10) and 11), i.e.,

The polar decomposition of Tx is thus



 $\frac{11}{\sqrt{2a^{2}}} = 0, \quad \frac{11}{\sqrt{2a^{2}}} = \frac{11}{2} = 0$

null eigenvector of 10.0% and 04

+1 eigenvector of JOG; is mapped by U= 0x to null eigenvector of 0x.