N 2

B

$A = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$ $\quad A A^T = \begin{pmatrix} 2 & 2 \\ 2 & 2 \end{pmatrix}$

$(2-\lambda)^2 - 4 = 0 \quad 2-\lambda = \pm 2$

$\sigma_1 = 2 \; ; \; \sigma_2 = 0$

$\begin{pmatrix} -2 & 2 \\ 2 & -2 \end{pmatrix} \begin{pmatrix} \tilde{x}_1 \\ \tilde{x}_2 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \Rightarrow \tilde{\vec{x}} = \begin{pmatrix} -\sqrt{2}^{-1} \\ -\sqrt{2}^{-1} \end{pmatrix}$

$\begin{pmatrix} 2 & 2 \\ 2 & 2 \end{pmatrix} \begin{pmatrix} \tilde{y}_1 \\ \tilde{y}_2 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \Rightarrow \tilde{\vec{y}} = \begin{pmatrix} \sqrt{2}^{-1} \\ \sqrt{2}^{-1} \end{pmatrix}$

$$A = \begin{pmatrix} -\sqrt{2}^{-1} & \sqrt{2}^{-1} \\ -\sqrt{2}^{-1} & -\sqrt{2}^{-1} \end{pmatrix} \begin{pmatrix} 2 & 0 \\ 0 & 0 \end{pmatrix} \begin{pmatrix} -\sqrt{2}^{-1} & -\sqrt{2}^{-1} \\ \sqrt{2} & -\sqrt{2}^{-1} \end{pmatrix}$$