MAT 167 Homework 7

Hardy Jones
999397426
Professor Cheer
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$$A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix}$$

$$A^T A = \begin{bmatrix} 1 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 1 \end{bmatrix}$$

$$\begin{aligned} |A^T A - \lambda I| &= 0 \\ &= \begin{vmatrix} 1-\lambda & 1 & 0 \\ 1 & 2-\lambda & 1 \\ 0 & 1 & 1-\lambda \end{vmatrix} \\ &= (1-\lambda)[(2-\lambda)(1-\lambda)-1] - (1-\lambda) \\ &= (1-\lambda)[[(2-\lambda)(1-\lambda)-1]-1] \\ &= (1-\lambda)(\lambda^2 - 3\lambda) \\ &= \lambda(1-\lambda)(\lambda-3) \end{aligned}$$

$$AA^T = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$$

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