

Math Review Homework.
Linear Algebra Problem Set 2.

Let A and B be the following matrices:

$$A = \begin{bmatrix} \frac{5}{2} & -\frac{3}{2} \\ -\frac{3}{2} & \frac{5}{2} \end{bmatrix} = \frac{1}{2} \begin{bmatrix} 5 & -3 \\ -3 & 5 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} \frac{9}{2} & \frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{11}{2} \end{bmatrix} = \frac{1}{2} \begin{bmatrix} 9 & \sqrt{3} \\ \sqrt{3} & 11 \end{bmatrix}$$

1. Find the eigenvalues and eigenvectors of A.
2. Diagonalize A
3. Plot the changes in the \mathcal{L}_2 and \mathcal{L}_1 unit circles due to the change of basis matrix used to diagonalize A. If you can't program, then just choose a few angles to look at the \mathcal{L}_2 unit circle or work with someone who can program. What shape results from the change of basis? You may have to remind yourself about some analytical geometry.^{c_e}
4. Simultaneously diagonalize A and B.^{c_e}