Homework- Graphing

Sketch solution curves to $\mathbf{x}' = A\mathbf{x}$ given the matrix A in each problem below. For your convenience, the eigenvalues and eigenvectors are also provided.

1. $A = \begin{bmatrix} -1/2 & 1 \\ -1 & -1/2 \end{bmatrix}$, $\lambda = -\frac{1}{2} + i$ with $\mathbf{v} = \begin{bmatrix} 1 \\ i \end{bmatrix}$

2. $A = \begin{bmatrix} -1 & -1 \\ 0 & -1/4 \end{bmatrix}$, with $\lambda_1 = -1$, $\mathbf{v}_1 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$ and $\lambda_2 = -1/4$, $\mathbf{v}_2 = \begin{bmatrix} -4 \\ 3 \end{bmatrix}$

3. $A = \begin{bmatrix} 3 & -2 \\ 4 & -1 \end{bmatrix}$, $\lambda = 1 + 2i$ with $\mathbf{v} = \begin{bmatrix} 1 \\ 1 - i \end{bmatrix}$

4. $A = \begin{bmatrix} 1 & -1 \\ -2 & 0 \end{bmatrix}$, with $\lambda_1 = -1$, $\mathbf{v}_1 = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and $\lambda_2 = 2$, $\mathbf{v}_2 = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$

SOLUTIONS

The solutions are shown below using the software available on Canvas, but you should have something similar from a hand-drawn sketch. It is difficult to determine how "tight" the spirals are, so don't worry if yours doesn't go around as often (or vice-versa)- What is important there is the direction of the rotation (clockwise vs counterclockwise).