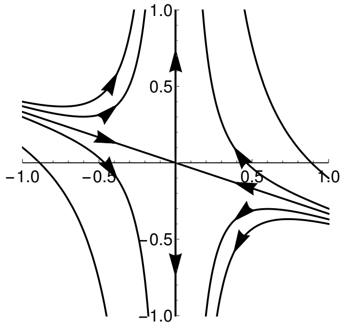
5. [15 points] For each of the following the given figure is a phase portrait for a system $\mathbf{x}' = \mathbf{A}\mathbf{x}$, where $\mathbf{A}$ is a constant 2×2 matrix. For each select the correct characterization of the eigenvalues of $\mathbf{A}$ and fill in the requested information about an eigenvector of this matrix.

a. [5 points]

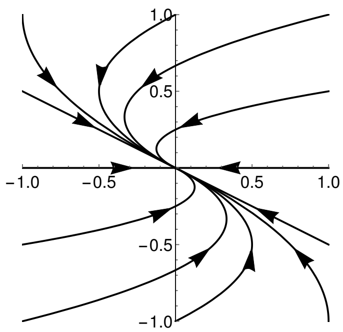


The eigenvalues of $\mathbf{A}$ could be (circle one):

$\lambda_1 = 1,\ \lambda_2 = 2;$ $\lambda_1 = -1,\ \lambda_2 = 2;$
$\lambda_1 = -1,\ \lambda_2 = -2;$ $\lambda_{1,2} = 1 \pm i;$
$\lambda_{1,2} = -1 \pm i$

If possible, give one eigenvector of $\mathbf{A}$ (if it is not possible, write "n/a"):

b. [5 points]

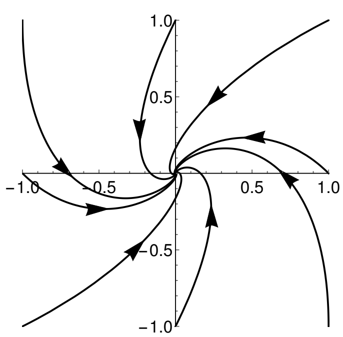


The eigenvalues of $\mathbf{A}$ could be (circle one):

$\lambda_1 = 1,\ \lambda_2 = 2;$ $\lambda_1 = -1,\ \lambda_2 = 2;$
$\lambda_1 = -1,\ \lambda_2 = -2;$ $\lambda_{1,2} = 1 \pm i;$
$\lambda_{1,2} = -1 \pm i$

If possible, give one eigenvector of $\mathbf{A}$ (if it is not possible, write "n/a"):

c. [5 points]



The eigenvalues of $\mathbf{A}$ could be (circle one):

$\lambda_1 = 1,\ \lambda_2 = 2;$ $\lambda_1 = -1,\ \lambda_2 = 2;$
$\lambda_1 = -1,\ \lambda_2 = -2;$ $\lambda_{1,2} = 1 \pm i;$
$\lambda_{1,2} = -1 \pm i$

If possible, give one eigenvector of $\mathbf{A}$ (if it is not possible, write "n/a"):