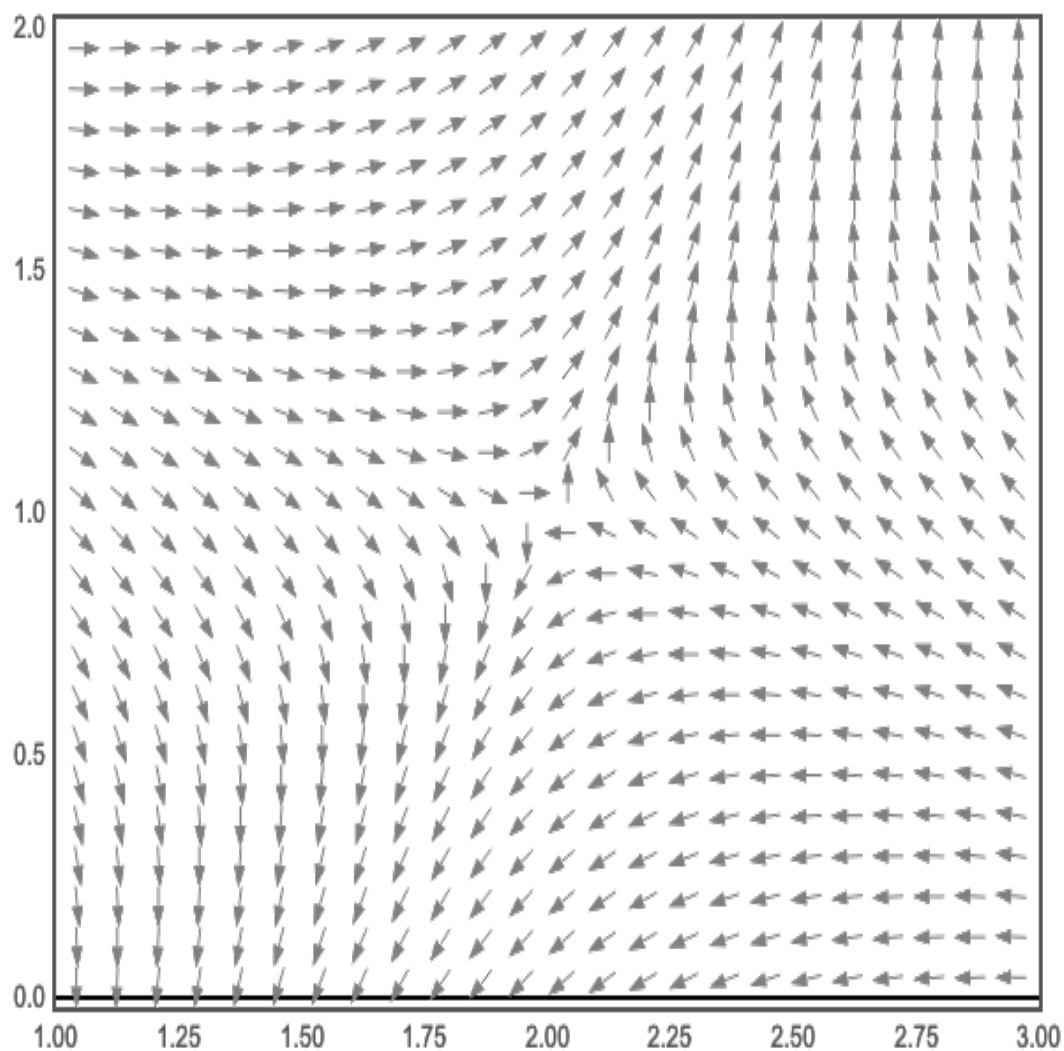


Recitation

Section 3.2: Exercise 15

$$x' = -x + y + 1, \quad y' = x + y - 3$$

- Find the equilibrium solution, or critical point, of the given system.
- Use a computer to draw a direction field and phase portrait centered at the critical point.
- Describe how the system behaves in the vicinity of the critical point.

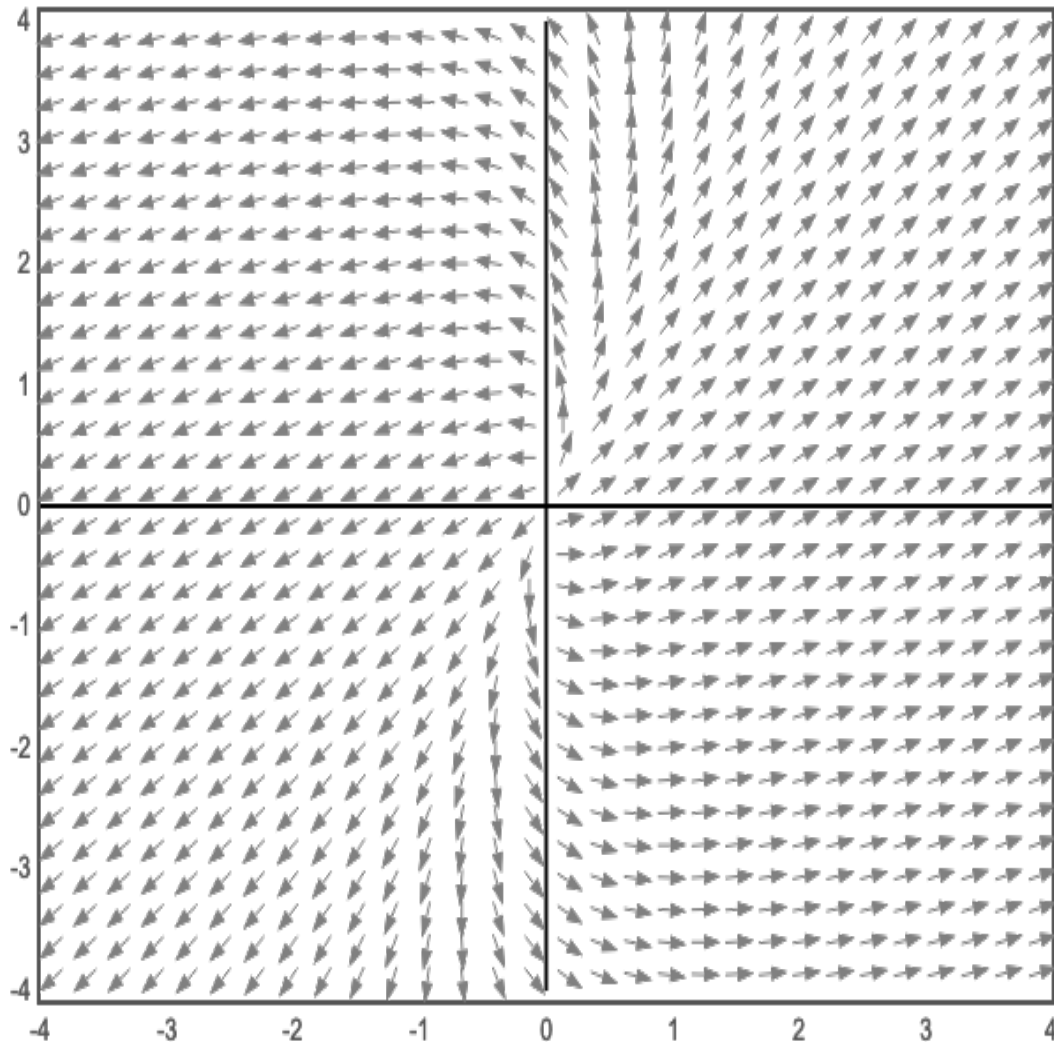


See <https://homepages.bluffton.edu/~nesterd/java/slopefields.html>

Section 3.3: Exercise 10

$$\mathbf{x}' = \begin{pmatrix} 5 & -1 \\ 3 & 1 \end{pmatrix} \mathbf{x}$$

Find the general solution of the given system of equations. Also draw a direction fields and phase portrait. Describe the behaviour of the solution as $t \rightarrow \infty$.



See <https://homepages.bluffton.edu/~nesterd/java/slopefields.html>

Section 3.3: Exercise 19

The eigenvalues and eigenvectors of \mathbf{A} are given. Consider the corresponding system $\mathbf{x}' = \mathbf{A}\mathbf{x}$. Without using a computer, draw each of the following graphs:

1. Sketch a phase portrait of the system.
2. Sketch a trajectory passing through the initial point $(2, 3)$.
3. For the trajectory in part (b), sketch the component plots of x_1 versus t and x_2 versus t on the same set of axes.

$$\lambda_1 = -1 \quad \mathbf{v}_1 = \begin{pmatrix} -1 \\ 2 \end{pmatrix}; \quad \lambda_2 = 2 \quad \mathbf{v}_2 = \begin{pmatrix} 1 \\ 2 \end{pmatrix}.$$