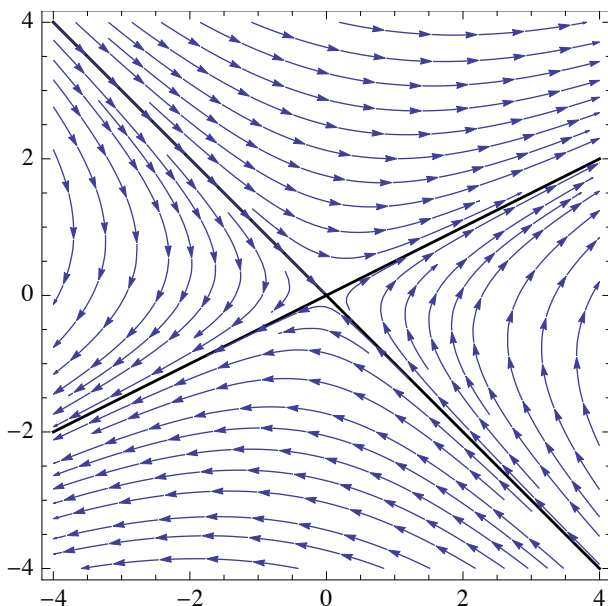


# Lecture Handout, May 1: Phase Portraits

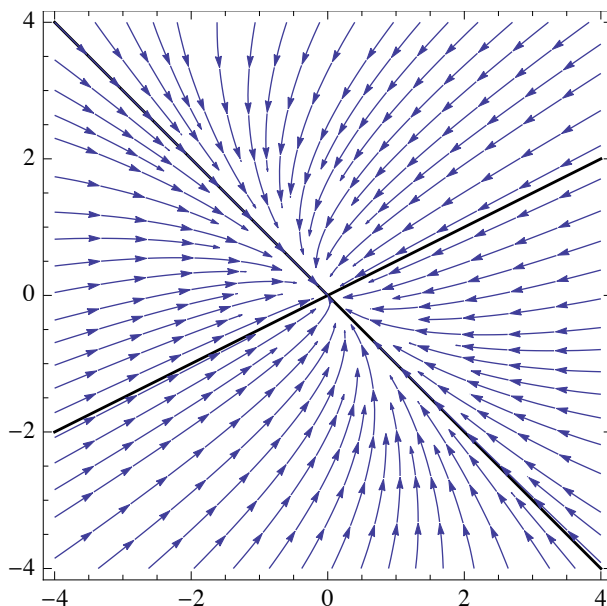
$$\begin{aligned} x' &= x + 4y \\ y' &= 2x - y \end{aligned}$$



Eigenvalues: \_\_\_\_\_

Behavior: \_\_\_\_\_

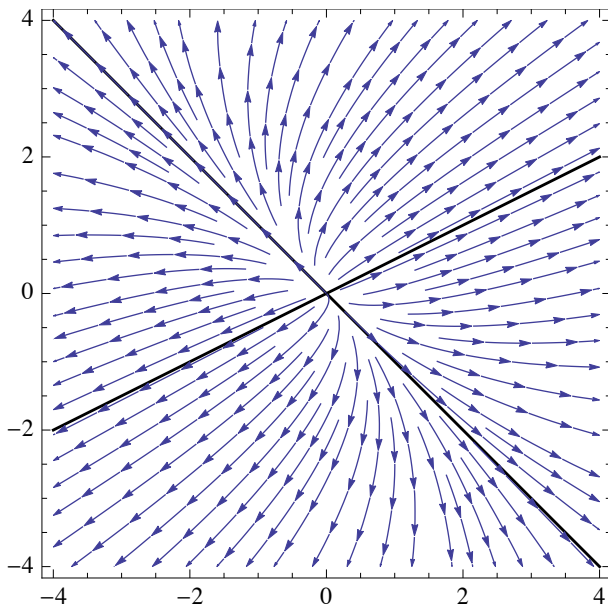
$$\begin{aligned} x' &= -5x - 2y \\ y' &= -x - 4y \end{aligned}$$



Eigenvalues: \_\_\_\_\_

Behavior: \_\_\_\_\_

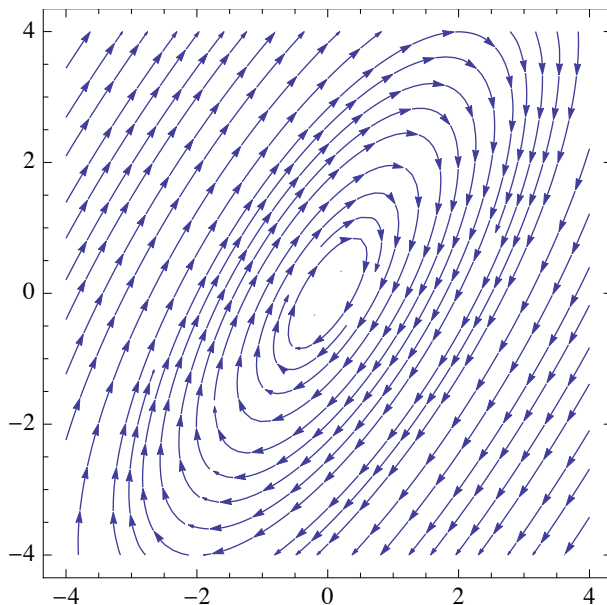
$$\begin{aligned} x' &= 5x + 2y \\ y' &= x + 4y \end{aligned}$$



Eigenvalues: \_\_\_\_\_

Behavior: \_\_\_\_\_

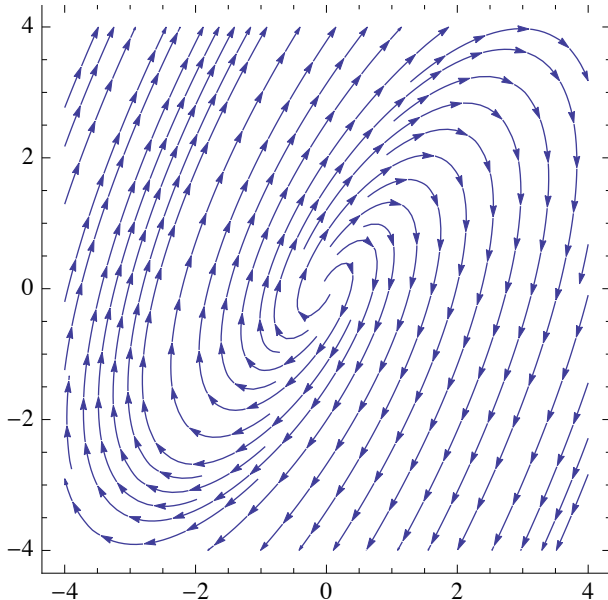
$$\begin{aligned} x' &= -2x + 2y \\ y' &= -4x + 2y \end{aligned}$$



Eigenvalues: \_\_\_\_\_

Behavior: \_\_\_\_\_

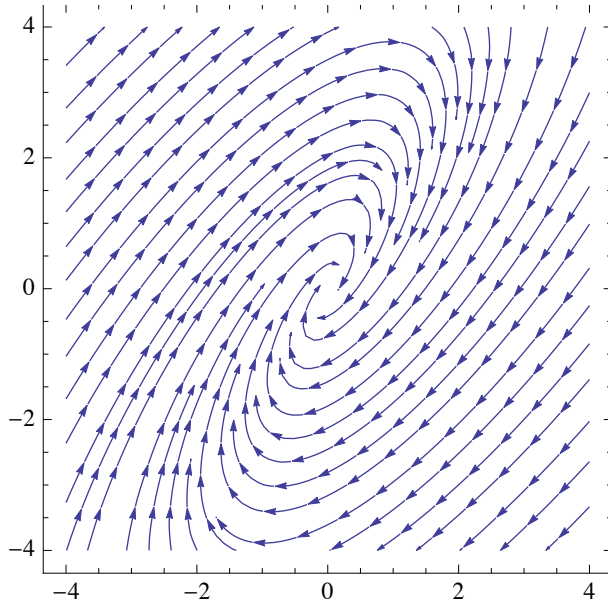
$$\begin{aligned} x' &= -x + 2y \\ y' &= -4x + 3y \end{aligned}$$



Eigenvalues: \_\_\_\_\_

Behavior: \_\_\_\_\_

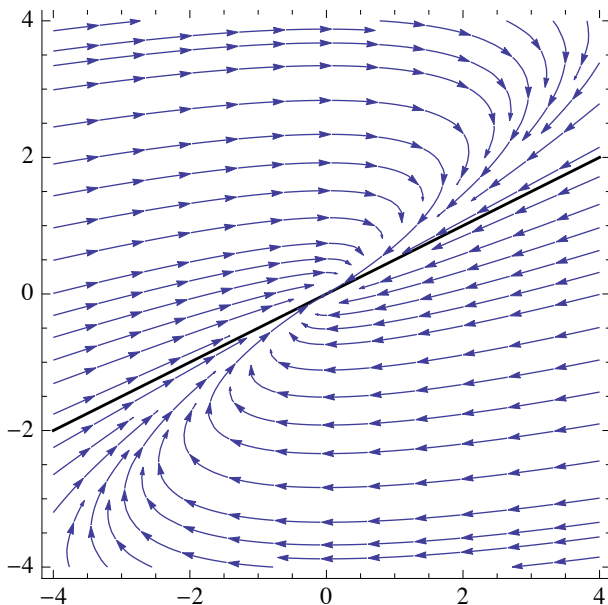
$$\begin{aligned} x' &= -3x + 2y \\ y' &= -4x + y \end{aligned}$$



Eigenvalues: \_\_\_\_\_

Behavior: \_\_\_\_\_

$$\begin{aligned} x' &= -4x + 4y \\ y' &= -x \end{aligned}$$



Eigenvalues: \_\_\_\_\_

Behavior: \_\_\_\_\_