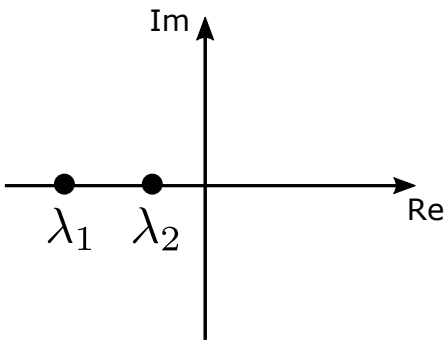
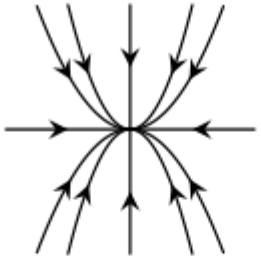
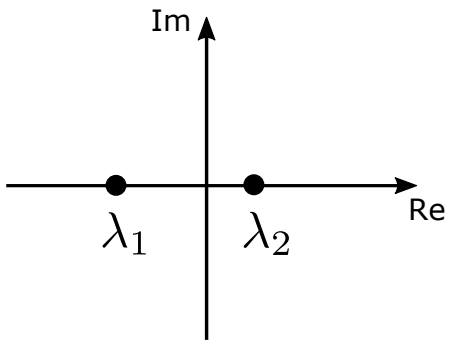
(a)



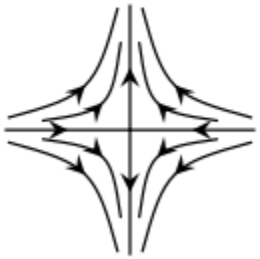
stable node



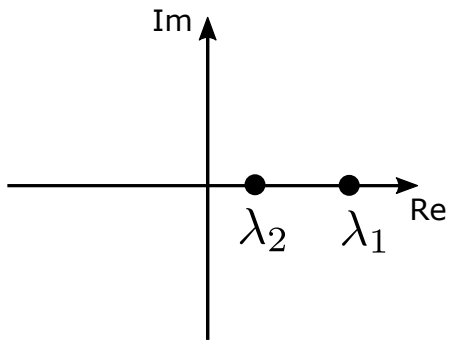
(b)



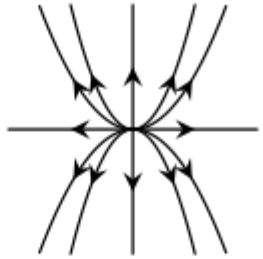
saddle



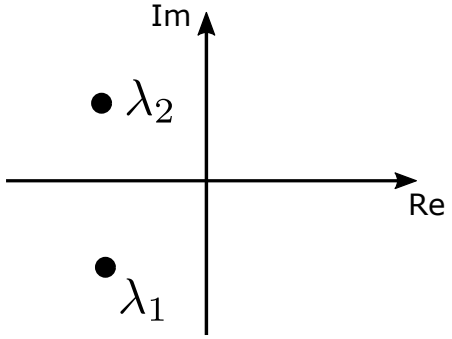
(c)



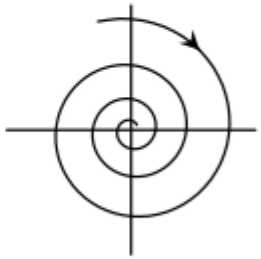
unstable node



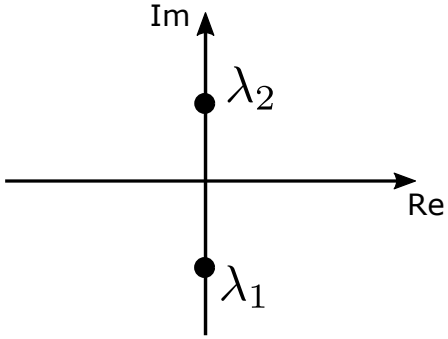
(d)



stable focus

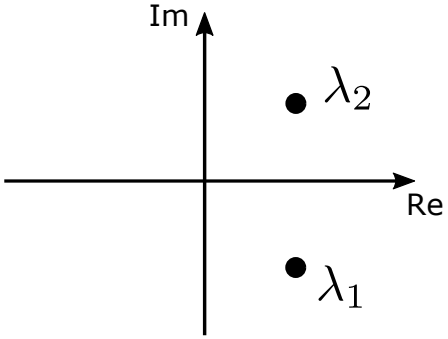


(e)

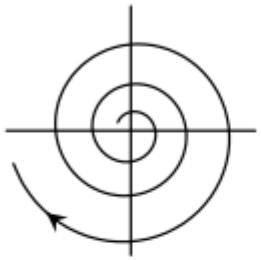


center

(f)

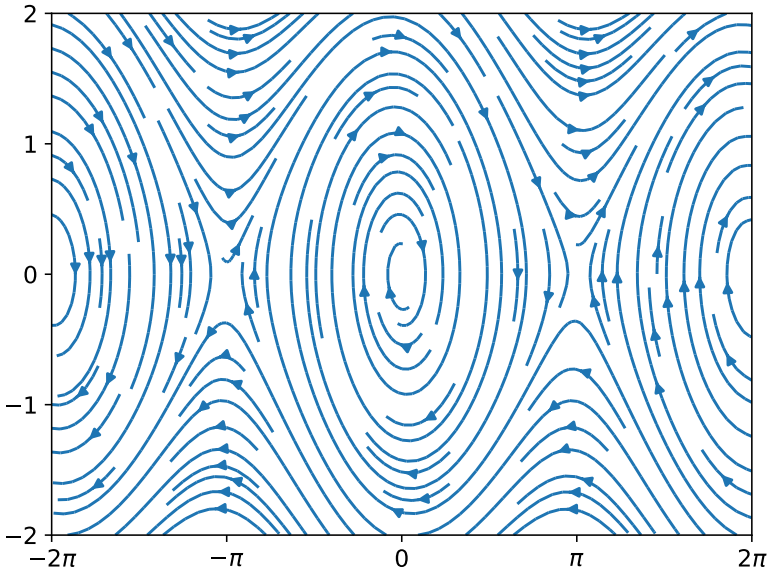


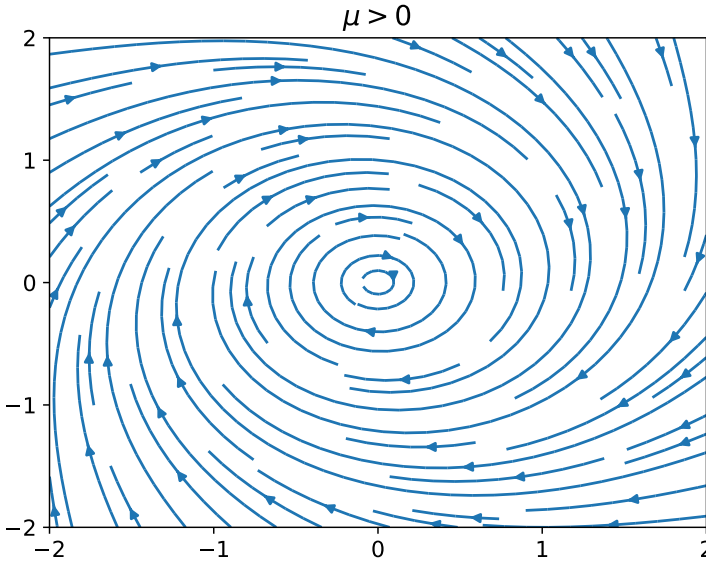
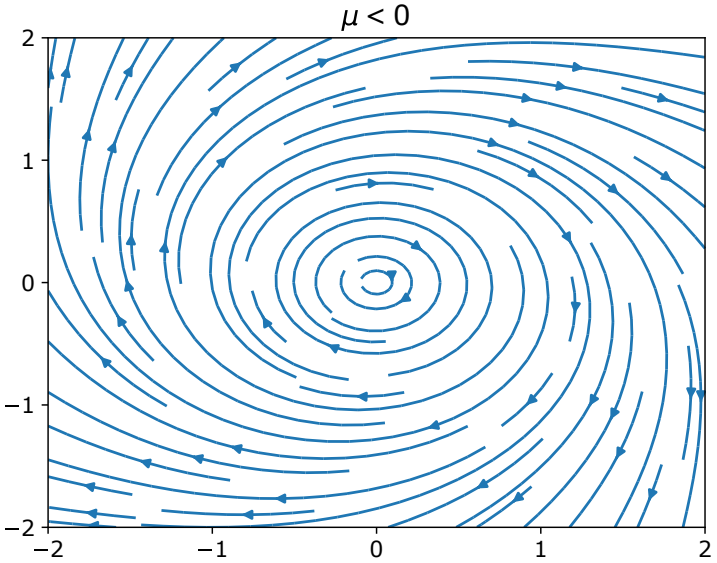
unstable focus



Example 1:

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}x_2\\ -\sin(x_1) - \frac{1}{10}x_2\end{bmatrix}$$



Example 2:

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}x_2 - \mu x_1(x_1^2 + x_2^2)\\ -x_1 - \mu x_2(x_1^2 + x_2^2)\end{bmatrix}$$