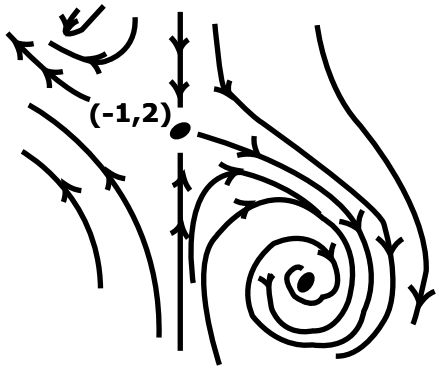
18.034 5/3/04

Recitation Suggestion

Maybe do another example,

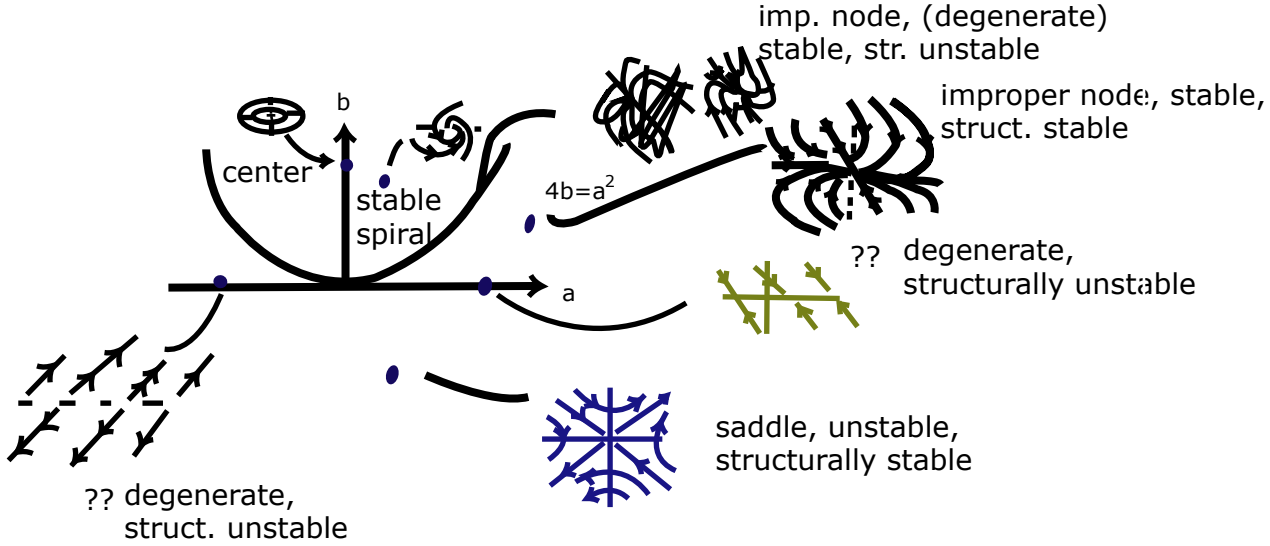
$$\begin{cases} x' = (-x + 2y)(x + 1) \\ y' = -2x - y \end{cases}$$

Eq. pts = (0, 0) and (-1, 2).
At (0, 0), get a stable spiral, spiraling clockwise in.
At (-1, 2), get a node W/ eigenvector, eigenvalue pairs:
$\lambda = 5, v = \begin{bmatrix} 3 \\ -1 \end{bmatrix}; \lambda = -1, v = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$.
x=-1 gives solution curves. So the graph is



W/ separatrix $x = -1$, $\begin{matrix} y>0 \\ y<0 \end{matrix}$

Perhaps remind students of the orbital portraits for $y'' = ay' + by = 0$:



These portraits were originally given in Lecture 16. Next time we will discuss stability & structural stability and generalize to arbitrary 2D linear systems.