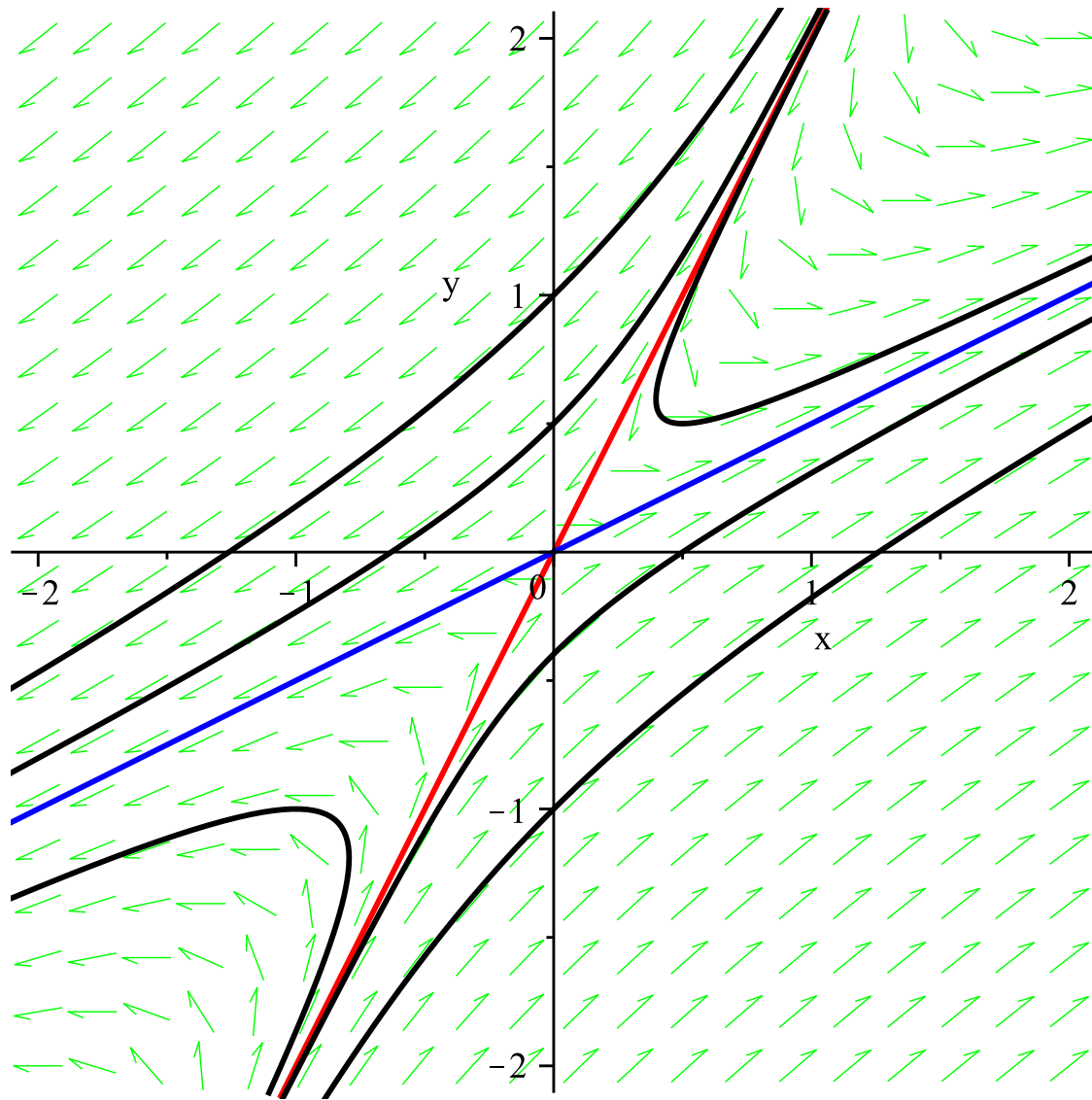# The Phase Plane Of Linear Systems

Math 527, Fall 2012

The slides which follows are phase portraits, produced by Maple, of the linear systems that we analyized in class on October 08 and 15, as well as a couple of others. They represent most of the basic types: a saddle point, a stable and an unstable node, an unstable focus, and a center.
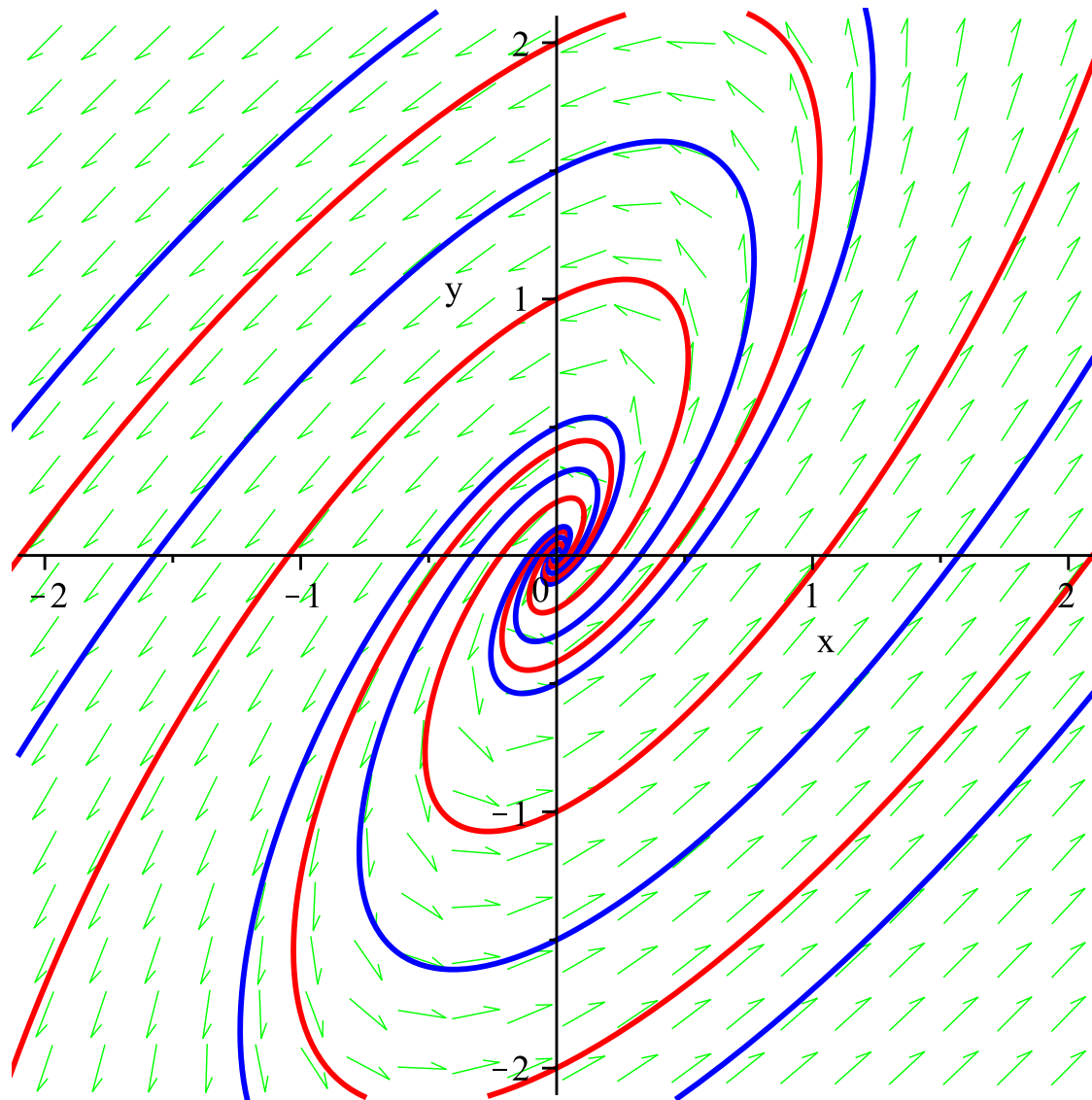
A saddle point: The system $\begin{pmatrix} x \\ y \end{pmatrix}' = \begin{pmatrix} 3 & -2 \\ 2 & -2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$.
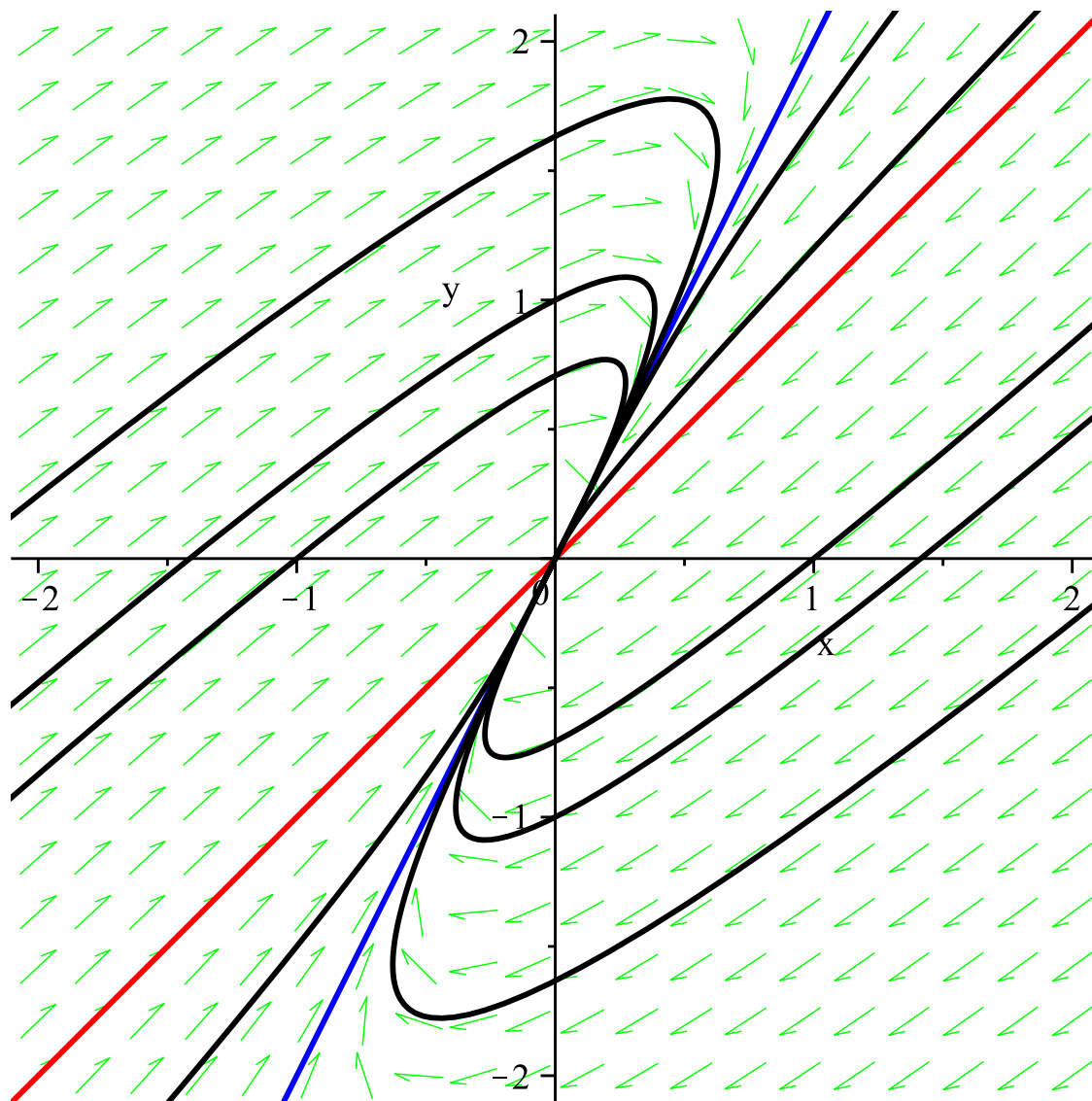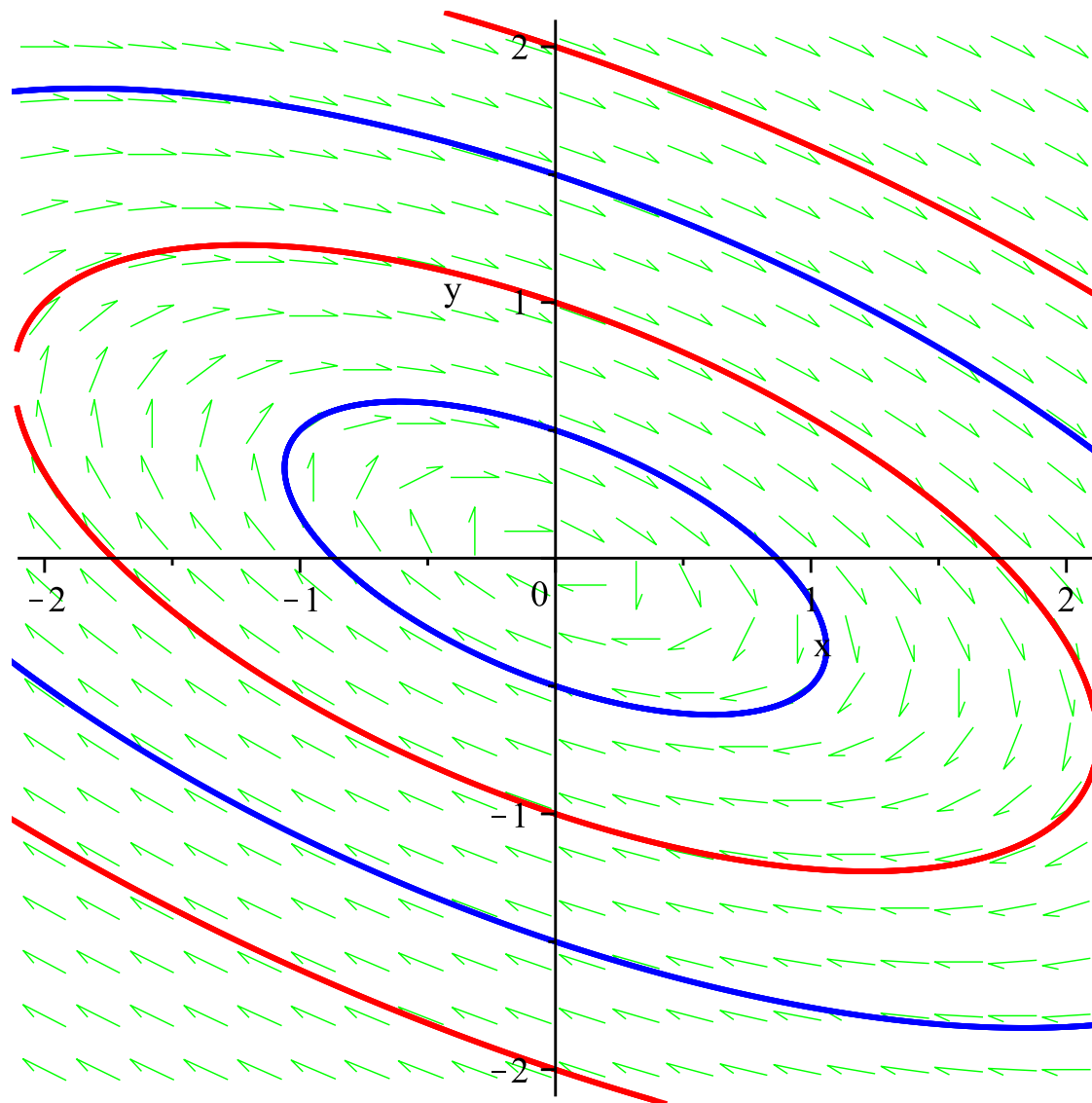
A stable node: The system $\begin{pmatrix} x \\ y \end{pmatrix}' = \begin{pmatrix} -5 & 2 \\ -4 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$.
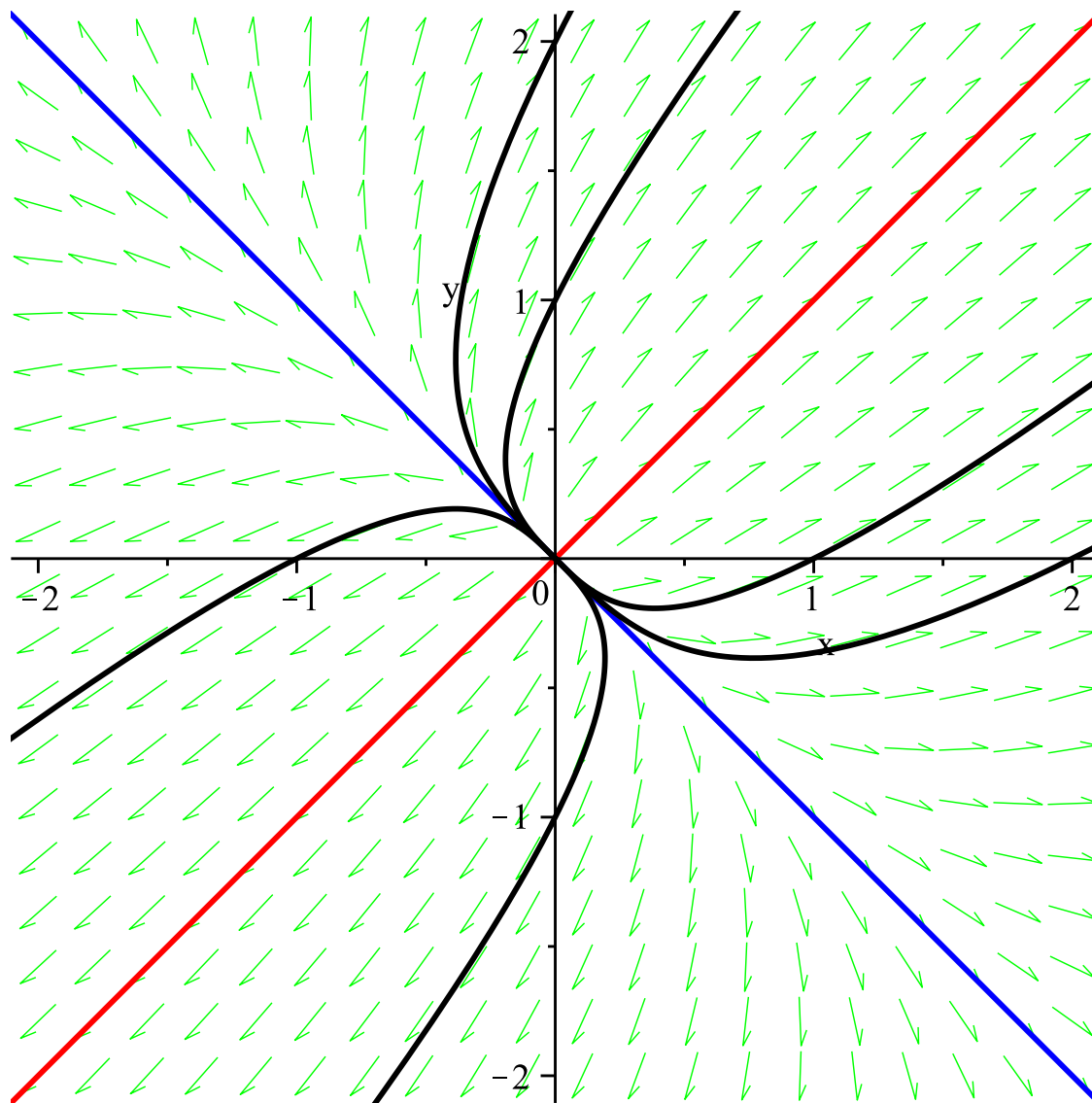
An unstable node: The system $\begin{pmatrix} x \\ y \end{pmatrix}' = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$.

An unstable focus (spiral): The system $\begin{pmatrix} x \\ y \end{pmatrix}' = \begin{pmatrix} 3 & -2 \\ 4 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}.$

A center: The system $\begin{pmatrix} x \\ y \end{pmatrix}' = \begin{pmatrix} 1 & 3 \\ -1 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$.