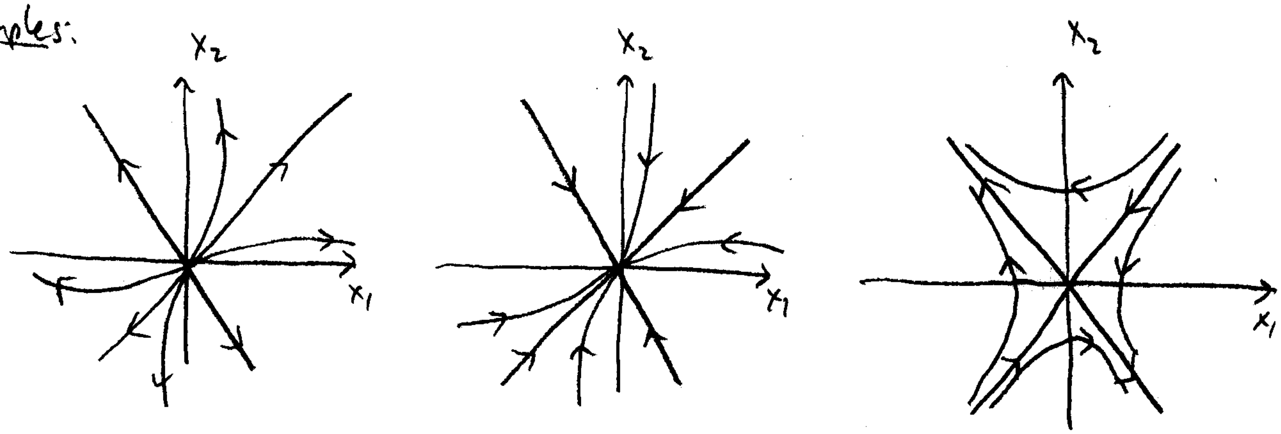
MTHSC 208, Spring 2011

Week 8 summary:

- The system $\vec{x}' = A\vec{x}$ has general solution $\vec{x}(t) = C_1 e^{\lambda_1 t}\vec{v}_1 + C_2 e^{\lambda_2 t}\vec{v}_2$, where $\lambda_{1,2}$ are the eigenvalues of A, and $\vec{v}_{1,2}$ are the eigenvectors.
- To solve $\vec{x}' = A\vec{x} + \vec{b}$, find the steady-state solution $\vec{x}_{ss}(t)$ (set $\vec{x}' = 0$), then solve the homogeneous system (set $\vec{b} = 0$). The general solution is $\vec{x}(t) = \vec{x}_h(t) + \vec{x}_{ss}(t)$.
- Phase portraits: Plotting x_2 vs. x_1. The "eigenvector lines" contain straight line solutions.

Examples:



$\lambda_1 > \lambda_2 > 0$ $\qquad$ $\lambda_1 < \lambda_2 < 0$ $\qquad$ $\lambda_1 < 0 < \lambda_2$