Nonlinear Systems

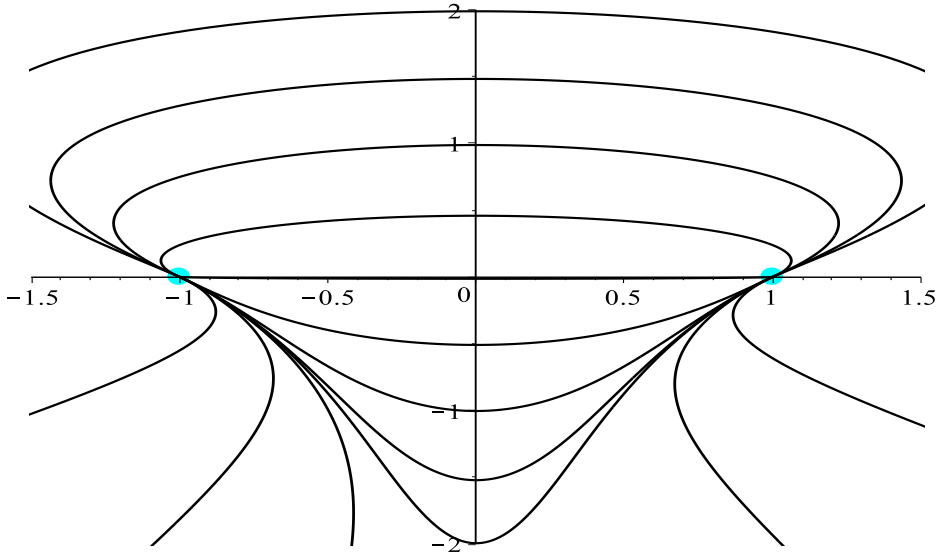
In class, we considered the following system:

$$\begin{aligned} \dot{y}_1 &= y_1^2 - e^{y_2}, \\ \dot{y}_2 &= y_1 y_2. \end{aligned} \tag{1}$$

We found that:

- $(1,0)$ was an unstable node with $\lambda_1 = 2$, $\mathbf{z}_1 = (1,0)$ and $\lambda_2 = 1$, $\mathbf{z}_2 = (1,1)$.
- $(-1,0)$ was a stable node with $\lambda_1 = -1$, $\mathbf{z}_1 = (-1,1)$ and $\lambda_2 = -2$, $\mathbf{z}_2 = (1,0)$.

The phase plane is shown below.



Phase plane for (1).