

Suppose A is a real 2×2 matrix with distinct real eigenvalues $\lambda_1 > \lambda_2 > 0$. Let v_1, v_2 be the corresponding eigenvectors.

Let $y(t)$ be a solution of $y' = Ay$ such that the initial condition $y(0)$ is not proportional to v_1 .

Prove that the trajectory of $y(t)$ in $\mathbb{R}^2$ is tangent to the line $\mathbb{R} \cdot v_2$ as $t \rightarrow -\infty$.