4. Consider the linear system of ODEs with real parameter $\beta$:

\[
\frac{dx}{dt} = x + y \\
\frac{dy}{dt} = x + \beta y
\]

Suppose the initial point is not at the origin, $(x(0), y(0)) \neq (0, 0)$.

For what values of $\beta$ and initial conditions $(x(0), y(0))$ is it possible for the solutions to approach $(0, 0)$ as $t \to \infty$? Explain your answer carefully.