The general system (1) can be analyzed in exactly the same way as in the example. The critical points of the system (1) are the solutions of
\[ x(a - \alpha y) = 0, \quad y(-c + \gamma x) = 0, \]
that is, the points \((0, 0)\) and \((c/\gamma, a/\alpha)\). We first examine the solutions of the corresponding linear system near each critical point.

In the neighborhood of the origin the corresponding linear system is
\[
\frac{d}{dt} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} a & 0 \\ 0 & -c \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}. \tag{14}
\]
The eigenvalues and eigenvectors are
\[
r_1 = a, \quad \xi^{(1)} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}; \quad r_2 = -c, \quad \xi^{(2)} = \begin{pmatrix} 0 \\ 1 \end{pmatrix}, \tag{15}
\]
so the general solution is
\[
\begin{pmatrix} x \\ y \end{pmatrix} = c_1 \begin{pmatrix} 1 \\ 0 \end{pmatrix} e^{at} + c_2 \begin{pmatrix} 0 \\ 1 \end{pmatrix} e^{-ct}. \tag{16}
\]
Thus the origin is a saddle point and hence unstable. Entrance to the saddle point is along the \(y\)-axis; all other trajectories depart from the neighborhood of the critical point.

Next consider the critical point \((c/\gamma, a/\alpha)\). If \(x = (c/\gamma) + u\) and \(y = (a/\alpha) + v\), then the corresponding linear system is
\[
\frac{d}{dt} \begin{pmatrix} u \\ v \end{pmatrix} = \begin{pmatrix} 0 & -ac/\gamma \\ \gamma a/\alpha & 0 \end{pmatrix} \begin{pmatrix} u \\ v \end{pmatrix}. \tag{17}
\]
The eigenvalues of the system (17) are \(r = \pm i \sqrt{ac}\), so the critical point is a (stable) center of the linear system. To find the trajectories of the system (17) we can divide the second equation by the first to obtain
\[
\frac{dv}{du} = \frac{dv/dt}{du/dt} = -\frac{(\gamma a/\alpha)u}{(ac/\gamma)v}, \tag{18}
\]