Assignment 9

In each of questions 1, 2, 3 determine all the critical points of the given system and discuss their type and stability.

1. $$\begin{aligned} \frac{dx}{dt} &= x - xy \\ \frac{dy}{dt} &= x + 2y \end{aligned}$$

2. $$\begin{aligned} \frac{dx}{dt} &= -x - 2y \\ \frac{dy}{dt} &= 2x + y \end{aligned}$$

3. $$\begin{aligned} \frac{dx}{dt} &= -x^2 + y^2 \\ \frac{dy}{dt} &= 1 - x \end{aligned}$$

4. Sketch the trajectories of the system

$$\begin{aligned} \frac{dx}{dt} &= y \\ \frac{dy}{dt} &= -12x + 6x^2. \end{aligned}$$

Does the system have any periodic solutions?