Differential Equations Seminar: Week 7 Exercises

For each of the following systems, show the non-existence of cycles:

1. $x'' - (x')^2 - (1 + x^2) = 0$
2. $x'' - (x^2 + 1)x' + x^5 = 0$
3. $\begin{aligned} x' &= x - y + xy^2 \\ y' &= x \end{aligned}$
4. $\begin{aligned} x' &= 1 + xy \\ y' &= 2x^2 + x^2y^2 \end{aligned}$
5. $\begin{aligned} x' &= -x - y + 2x^2 + y^2 \\ y' &= x \end{aligned}$
6. $\begin{aligned} x' &= y + x^2y \\ y' &= xy + 2 \end{aligned}$
7. $\begin{aligned} x' &= y + x^3 \\ y' &= x + y + 2y^3 \end{aligned}$
8. $\begin{aligned} x' &= -y \\ y' &= x + y - x^2 - y^2 \end{aligned}$