

Homework Assignment 7, Due Thursday, November 11

- 1) (Chicone Ex. 1.76) Prove that a gradient system cannot have a periodic orbit.
- 2) (Chicone Ex 1.201) Prove that the system

$$\dot{x} = x - y - x^3, \quad \dot{y} = x + y - y^3, \quad x, y \in \mathbb{R},$$

has a unique periodic orbit that is globally attracting on $\mathbb{R}^2 \setminus \{0\}$. (This means that, for any $\xi \in \mathbb{R}^2$, $\xi \neq 0$, $\phi(t; \xi)$ converges to the periodic orbit.)