

MATH 449 Homework 5 - Due Friday March 30.

1. Undamped Pendulum:

Consider the undamped pendulum modeled by

$$\ddot{\theta} + \omega \sin(\theta) = 0 \quad \text{where} \quad \omega = g/L$$

Convert this to a system of first order equations where $v = \dot{\theta}$.

- (a) Show that the system is reversible
 - (b) Show that the system is conservative
 - (c) Show that the conserved quantity $H(\theta, v)$ has a local extremum (max or min) at $(0,0)$.
 - (d) Sketch the phase portrait and describe the different types of trajectories in terms of a pendulum.
2. Choose one: 6.5.6, 6.5.7, or 6.5.19
3. Do 6.8.7. The answer is in the back of the book but I want you to show your work determining the types of fixed points, sketch the phase plane, and provide your answer based on this evidence. You can check your answer with the text but don't copy it.

suggested homework: 6.8.2 - 6.8.5

Test II - Monday April 2.

Test II will cover all of chapters 5 and 6 from the text (excluding 6.7).