

Math 441 (Spring 2017) Assignment Six

Topics: Two dimensional flows: α and ω limit sets, Poincare Bendixson Theorem, no chaos in two dimensions, limit cycles. Chapter 7 in Strogatz and Chapter 10 in Hirsch and Smale.

1. (Poincare Bendixson theorem) Prove the lemmas 1, 2 and 3 stated in class (leading up to Poincare-Bendixson theorem).
2. (Phase portrait) 7.1.3, 7.1.4.
3. (Coordinate change) 7.1.5
4. (Existence, uniqueness and stability of a limit cycle) 7.1.8
5. (Gradient system, phase portrait) 7.2.2, 7.2.6 (a), 7.2.8
6. (Liapunov function) 7.2.10
7. (Dulac's criterion) 7.2.18.