

## Homework #8

Due: January 27, 2015

1. Consider the stable and unstable manifolds of a hyperbolic fixed point of a  $C^r$  vector field in  $R^n$  (for example  $n = 2$  and  $n = 3$ ):

$$\frac{dx}{dt} = f(x), \quad x \in R^n$$

- (a) Can the stable (respectively, unstable) manifold intersect itself? Why?
  - (b) Can the stable (respectively, unstable) manifold intersect the stable (respectively, unstable) manifold of a different fixed point? Why?
  - (c) Can the stable manifold intersect the unstable manifold? If so, what is the nature of the intersection?
  - (d) Can the stable (respectively, unstable) manifold intersect a periodic orbit? Why?
2. Consider questions 1a-d for the stable and unstable manifolds of a hyperbolic fixed point of a  $C^r$  diffeomorphism in  $R^2$  (for example, the Henon map).
  3. Ex 12 on Pg 162 of Meiss book.
  4. Choose two exercises from 8,9,10,11 on Pg 162 of Meiss book (bonus: do them all..).