Homework # 3
Due Oct. 9 at the beginning of class

- 2.3 Please also state if the fixed points are hyperbolic or not.
- A. Find the slight subtlety in the proof that AB and BA have the same eigenvalues. This underlies the fact that stability is the same independent of the point you pick in the periodic orbit. Specifically, write the relation stating λ is an eigenvalue of AB. Left multiply by B and interpret this as an eigenvalue relation for BA. Are the corresponding eigenvectors the same? This argument fails for one of λ. Explain why, then use the characteristic equation to prove it in this case.
- T2.7 a,b only.
- 2.8
- Comp. Exp. 2.2 Here you can take the guts of the `explormap2d.m` code and wrap it with something to do with a bifurcation diagram as requested. This is not hard but will be a good programming experience building on what you already know. Print out your x-coordinate diagram for $b = -0.3$ and $0 \leq a \leq 2.2$.
- T2.8 easy
- T2.10 Give two vectors parallel to the axes. Explain the surprising result that even though one of the eigenvalues of AA^T *exceeds* 1 in absolute value, the ellipses shrink to the origin.
- 2.9 Show a sketch as in Fig. 2.29 showing the action of the inverse cat map.
- Challenge 2 Glancing at Fig. 2.31 you see this linear map has complex behavior which makes it fun to investigate. :) Make sure you understand up to Step 5. Do Step 7 on your own (Fibonacci). Then write up:
  - Step 6 easy
  - Step 8 Plotting the solutions in the unit square will help you count them.
  - Step 9 Alex found a simpler formula than theirs. Can you find this formula?
  - Step 11 Write out a table only to $k = 6$. (You can skip Step 10. It is not needed.) Treat the proof that all periods exist only as an *optional* BONUS.