

Homework 3

Due: 2/8/2018

- Assignments are due at the beginning of class on the due date.
 - Any Matlab files are to be submitted as .m files via Moodle (with a corresponding run/driver file if necessary).
 - Each file must be uploaded individually. Zipped files will not be graded.
 - Show all work and provide discussion where needed in order to receive full credit.
-
1. Find the solution to the following dynamical systems.
 - a. $a_{n+1} = 3a_n/4$, $a_0 = 64$
 - b. $a_{n+1} = 0.1a_n + 3.2$, $a_0 = 1.3$
 2. Find an equilibrium value if one exists. Classify the equilibrium value as stable or unstable.
 - a. $a_{n+1} = 1.1a_n$
 - b. $a_{n+1} = a_n$
 - c. $a_{n+1} = -0.8a_n + 100$
 3. Your parents are considering a 30-year, \$100,000 mortgage that charges 0.5% interest each month. Formulate a model in terms of a monthly payment p that allows the mortgage (loan) to be paid off after 360 payments. (Hint: The model is of the form $a_{n+1} = ra_n + b$. If a_n represents the amount owed after n months, what are a_0 and a_{360})?
 4. In the attached data set attached to this assignment, V represents a mean walking velocity and P represents the population size. We wish to know if we can predict the population size P by observing how fast people walk.
 - a. Plot the data. What kind of relationship is suggested (linear, exponential, etc)?

- b. Test the model $P = aV^b$ by plotting the appropriate transformed data and determining appropriate parameter values. Show all work and label plots.
- c. Test the model $P = a \ln V$ by plotting the appropriate transformed data and determining appropriate parameter values. Show all work and label plots.
- d. Do either of the models appear to capture the trend of the data?