Homework, Week 1

- Tuesday, Sep 2

  1. Reading from "A First Course in Chaotic Dynamical Systems", Chapters 2-5. See the "Resources" tab in CLEo.
  2. Chapter 3 (Orbits), p. 26: 2, 3, 7(a), 7(b).
  3. Chapter 4 (Graphical Analysis) p. 34, 1(b), 1(g), 2(a).
  4. You decide to purchase a home at 6% annual interest for a term of 30 years (assume no down payment).
     - If the house costs $200,000, what will the monthly payment be?
     - If you can afford $1000 monthly payments, how much of a house can you afford?
  5. Suppose a rabbit population is increasing at a rate of about r percent (r is between 0 and 1) each month. If the initial population is P_0, and h is the "harvest rate", then is it possible to determine h to keep the population to about 1000 rabbits? Suppose that r is about 0.2, but we're not absolutely sure- Does that impact your calculations?

- Thurs, Sep 4

  1. Determine solutions to the following:
     (a) $x_{n+1} = x_n + 1$
     (b) $x + n + 1 = 5x_n + n^2$ (Hint: Guess a full quadratic)
  2. Give a closed form solution for the Fibonacci sequence,

     $$x_{n+2} = x_{n+1} + x_n$$

     How does your answer change if we specify $x_0 = 1$ and $x_1 = 1$?
  3. Find the general solution to

     $$x_{n+1} = \frac{1}{2}x_n + \frac{n}{2^n}.$$

     Do this by assuming that the the particular solution is of the form

     $$p_n = \frac{n(An + B)}{2^n}$$

  4. You currently have $5000 in a savings account paying 6% annual interest. If interest is compounded monthly, and you deposit $200 per month, how much do you have in savings after 5 years, and what is the total interest earned?