Homework 2

Math 469 (section 500), Spring 2016

This homework is due on Thursday, January 28. *You may cite results from class or the textbook.*

0. *(This problem is not to be turned in.)*

   (a) Read Sections 1.1–1.4 and 2.4.

   (b) Section 1.8 #1

   (c) Can you use cobwebbing to determine the limiting behavior of first-order, nonlinear difference equations? If not, what should you do instead?

   (d) Can you use cobwebbing to determine the limiting behavior of second-order, linear difference equations? If not, what should you do instead?

1. State an example of a second-order, non-homogeneous, linear, non-autonomous difference equation.

2. Determine the limiting behavior of solutions to the difference equation

$$x_{t+1} = ax_t + b \, ,$$

   where $a, b \in \mathbb{R}$. (How) does your answer depend on a, b, and x_0 (the initial value)?

3. Consider the difference equation

$$x_{t+1} = 5x_t - 1 \, .$$

   (a) What does the previous problem say about about the limiting behavior?

   (b) Use cobwebbing to verify the limiting behavior.

4. Consider the difference equation

$$x_{t+1} = 4x_t(1 - x_t) \, .$$

   (a) Is this difference equation linear?

   (b) Use cobwebbing to determine the limiting behavior.

5. Section 1.8 #3, 4, 5, 7