Name: Notes

SM275 · Mathematical Methods for Economics — Fall 2019 · Uhan

Quiz 2 – 4 September 2019

Instructions. You have 15 minutes to complete this quiz. You may use your calculator. You may not use any other materials (e.g., notes, homework, books).

Problem	Weight	Score
1	1	
2	1	
3	1	
4	1	
5	1	
6	1	
Total		/ 60

For Problems 1, 2 and 3, consider the DS

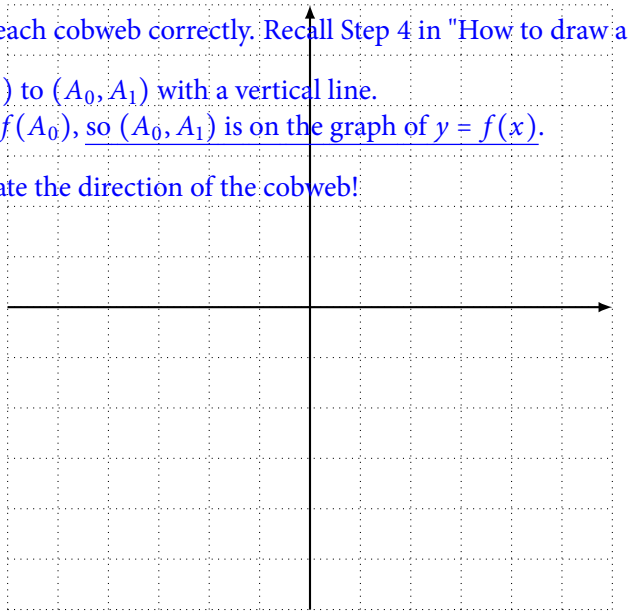
$$A_{n+1} = \frac{2}{3}A_n + 1 \qquad n = 0, 1, 2, \ldots$$

Problem 1. Draw the cobwebs with $A_0 = 5$ and $A_0 = 1$. Don't forget to indicate the direction of the cobwebs.

- Make sure you start each cobweb correctly. Recall Step 4 in "How to draw a cobweb" from Lesson 3:

  Connect $(A_0, 0)$ to (A_0, A_1) with a vertical line.
  Note that $A_1 = f(A_0)$, so (A_0, A_1) is on the graph of $y = f(x)$.

- Make sure you indicate the direction of the cobweb!



Problem 2. What are the fixed points of the DS?

- Recall that a fixed point of a DS $A_{n+1} = f(A_n)$ is a point c that satisfies $c = f(c)$.
- How can you identify c using a cobweb diagram?

Problem 3. Classify the fixed points you found in Problem 2 as attracting, repelling, or neither.

- Take a look at Lesson 3 to review the definitions of attracting and repelling fixed points.

For Problems 4, 5 and 6, consider the following setting.

We deposit \$1000 into a savings account initially and we withdraw \$100 at the end of each year. The annual interest rate is 0.05, compounded annually.

Problem 4. Let A_n be the amount in the account after n years. Write the DS and IC for this setting.

- Recall that the DS is the "setup." A first order DS is an equation that describes the relationship between A_{n+1} and A_n.
- When writing the IC, you need to write an equation: $A_0 = \ldots$. A number alone doesn't communicate enough.
- In a first order linear DS $A_{n+1} = sA_n + b$, s and b can be negative or zero.

Problem 5. Find the particular solution that satisfies the IC.

- Most of the errors here stemmed from getting the setup in Problem 4 incorrect.
- Be careful with your algebra and arithmetic/calculator.

Problem 6. Use the particular solution you found in Problem 5 to find the amount in the account after 10 years.

- Most of the errors here stemmed from getting the setup in Problem 4 incorrect.
- Be careful with your algebra and arithmetic/calculator.