

Math 241, Spring 2022 — Homework 1

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Due February 2 at 5:00 pm

Instructions. This problem set covers material from Week 1 of class, with a focus on Chapters 1 and 3 of the textbook.

Problem 1. Read Chapter 1 of our textbook, making sure to browse through the figures on pages 8 to 15. Please respond to the following questions, making sure to write in complete sentences.

1. In the figures of the various Julia sets, what do the black points represent? What do the colored points represent?
2. What role has the computer played in the development of the theory of dynamical systems?
3. In the brief history discussed through Section 1.2, what were you most curious to learn more about?

Problem 2. Try the following Exercises from Chapter 3, on pages 34 to 26.

1. Exercise 2 (try using MATLAB)
2. Exercise 7, parts b, c, e, f (try using algebra)
3. Exercise 8 (try using a graph/picture and explain the conclusion you can make from the picture in complete sentences)
4. Exercise 10 (a picture could help again when you think about fixed points, but also note that $F(x) = |x - 2|$ can be written as a piecewise function:

$$F(x) = \begin{cases} x - 2 & \text{if } x \geq 2 \\ -(x - 2) & \text{if } x < 2, \end{cases}$$

which could help when you try to interpret your picture and use algebra)

Problem 3. Write up your responses to Problems 1 and 2 from the class worksheet on January 27.