Homework Seven
Chaos and Fractals
College of the Atlantic
Due Friday 18 February, 2022[1]

There are two parts to this week's homework.

Part 1: WeBWorK. Do Homework 07 which you will find on your WeBWorK page. I recommend doing the WeBWorK part of the homework first. This will enable you to benefit from WeBWorK's instant, if not necessarily friendly, feedback before you do part two.

Part 2: Problems from the Textbook. Here are some instructions for how to submit this part of the assignment.

- Do the problems by hand using pencil (or pen) and paper. There is no need to type of this assignment.
- Make a pdf scan of your work using genius scan or some similar scanning app. Please make the homework into a single pdf, not multiple pdfs.
- Submit the assignment on google classroom.
- **If you want, do these problems in pairs.** If you do work in pairs, please submit only one set of solutions for the two of you. If you work with a friend and your friend submits the work, please submit an empty assignment and add a comment letting me know who you worked with. Thanks.

Here are some "textbook" problems, which aren't actually from the textbook.

1. Consider the following complex numbers:

$$z_1 = -4 - 2i , \quad z_2 = 3i , \quad z_3 = 2 + 0.5i , \quad z_4 = -2 + 0.5i , \tag{1}$$

$$z_5 = -2i , \quad z_6 = 2 + 0.5i , \quad z_7 = 4 - 2i , \quad z_8 = -4 - 2i . \tag{2}$$

   (a) Plot the above numbers[2] on the complex plane.
   (b) Connect the dots. The pattern should look familiar.

2. Consider the function $f(z) = iz$.

   (a) Determine first four iterates of $z_0 = 3$.
   (b) Determine first four iterates of $z_0 = 2i$.
   (c) Plot the iterates for each of the seeds in the complex plane.
   (d) How would you describe the behavior of the orbits?

And here are some textbook problems from the textbook, Chapter 21:

1. 21.1
2. 21.2
3. 21.3
4. 21.4
5. 21.5
6. Optional: 21.8, 21.9, 21.20

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[1]If you need more time, that's ok. Just let me know. Thanks!
[2]Yes, I know that there are two numbers that are there twice.