Practice Problems

MAT 335 – Chaos, Fractals, and Dynamics – Fall 2013

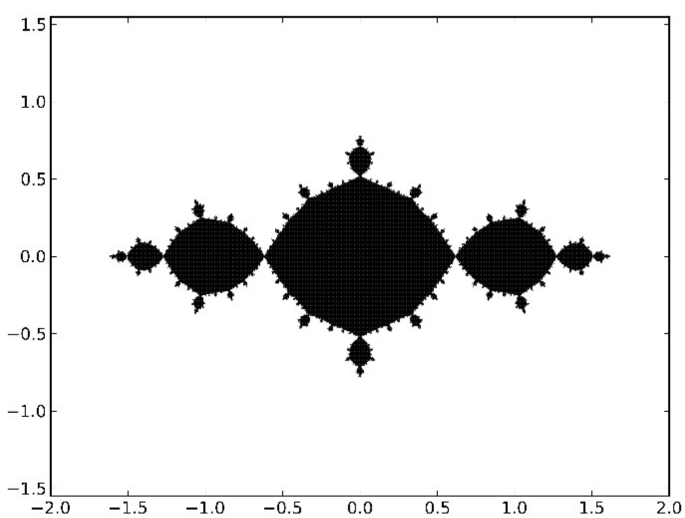
Not to be submitted

Here is a list of problems for practice from the textbook.

Chapter 15. 1, 2, 4, 5

Chapter 16. 7 (first part), 8 (first part)

- Find complex neutral fixed points of Q_c: Find $z \in \mathbb{C}$ such that $\left|Q_c'(z)\right| = 1$.
- How do K_c and J_c compare?
- Given K_{-1} below

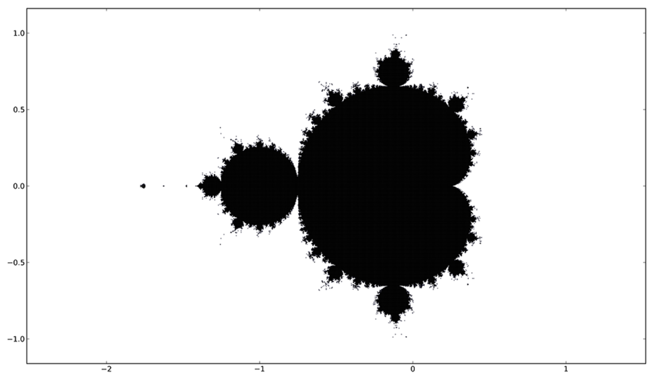


  find three points $z_1 = a \in \mathbb{R}$, $z_2 = bi$ with $b \in \mathbb{R}$ and $z_3 = x + iy$, with $x, y \neq 0$ such that the orbit of z_i under Q_{-1} is bounded.

- Find points $z_1, z_2, z_3 \in \mathbb{C}$ of the form of the previous ones such that the orbit of z_i under Q_{-1} is unbounded.

Chapter 17. 3

- For which values of c, there exists $z \in \mathbb{C}$, which is a neutral fixed point of Q_c.
- Sketch that set and compare it with the Mandelbrot set $\mathcal{M}$.
- What happens to the orbit of 0 under Q_{-2}? Does $-2 \in \mathcal{M}$?
- What happens to the orbit of 0 under Q_i? Does $i \in \mathcal{M}$?t
- Given the Mandelbrot set $\mathcal{M}$ below



  find complex values of find three points $c_1 = a \in \mathbb{R}$, $c_2 = bi$ with $b \in \mathbb{R}$ and $c_3 = x + iy$, with $x, y \neq 0$ such that the orbit of 0 under Q_{c_i} is bounded.

- Find complex values of $c_1, c_2, c_3 \in \mathbb{C}$ of the form of the previous ones for which the orbit of 0 under Q_{c_i} is unbounded.
- If $c = -1.8 + 1.8i$, is K_c connected or disconnected?