



MATH 321/322/323 Fractals Reading Course

Mark McGuinness

7.5 points, 60 hours work, equivalent to 12 lectures. The 60 hours is quality time, so best not to leave this until too late, as understanding sometimes needs time to chew it over.

The text is *Fractals Everywhere* by Michael Barnsley, Academic Press, 1988. It is a great book but quite expensive, so you might like to coordinate with the others who are doing this reading course and share/photocopy. There are two library copies, which you can request, on open loan. The bookshop can order it for you, which could take a while. Another place to buy the book at a reasonable price is

<http://www.bookdepository.com/Fractals-Everywhere-Michael-F-Barnsley/9780486488707>

READ: Chapters 2, 3, 4 (sections 1-5).

Questions to answer (1st edition; see below for 2nd edition changes):

Chapter 2: 2.5, 2.7, 3.11, 3.19, 4.11, 4.21, 4.26, 5.5, 6.9, 7.3

Chapter 3: 1.5, 3.4, 6.9, 7.9, 7.11, 8.1, 8.5, 9.2, 9.6, fig 3.10.3, fig 3.10.6, 10.11, 10.17(a) & (b), 11.4, 11.5

Chapter 4: 1.13, 1.15, 2.1, 2.2, 2.6, 2.13, 2.18, 3.11, 3.13, 4.2.

Assessment: I will mark your answers to the above questions, and grade you accordingly. You are on your honour to write your own answers, they must be your own work. Discussion of this material with others (or with me) is encouraged, however. The final date for handing in all questions is the last day of lectures in the Trimester you are doing MATH32*. Don't leave it too late, there is substantial work in this module. From previous students' experience, there is much more work than you can do, for example, in two solid weeks doing nothing else. Take smallish bites at it, over the whole Trimester.

Meetings: You are invited to meet with me in my office (Co 323) to discuss progress and problems from time to time as is convenient. x5059, or Mark.McGuinness@vuw.ac.nz

Highly Recommended: *Fractals for the Classroom* by Peitgen, Jurgens and Saupe, Springer-Verlag, 1992. Has some of Barnsley's material but different treatment and more.

Second Edition Notes

Differences in the second edition are:

Ch2 Q2.7 becomes Q2.8 in 2nd ed.

The tree-shaped condensation set is missing (a typo) in Ch Q9.2 of the 2nd ed.

In the second edition:

fig 3.10.3 becomes III 72, fig 3.10.6 becomes III 75, and 10.17 becomes III 85,86.

Ch4 Q2.13 should be in the complex plane, and the third transform should read $z/2 + i/2$

Ch4 Q3.11 is a little different but OK in both editions provided you don't restrict it to $[0,1]$.

In Ch.2 on page 20, Definition 4.2 asserts that a subset of a metric space is bounded if the entire space is contained within a ball of some real radius. It should say the subset is bounded if the subset is contained within that ball.