

INVESTIGATION WEEK 15

For your information..... The investigations from this Semester all build and combine to walk you through iterative processes that can create fractals. You **MUST** complete them in sequential order, get them signed off each week to ensure that any misunderstandings get corrected early.

There are 7 questions over 7 weeks.... (not necessarily 1 per week)

Questions 1-6 scaffold you to understanding how this complex iterative function works.

Question 7 is the most important question as it involves self directed investigation and exploration.

This collection of investigations will give you the capacity to be extremely creative. I hope you take advantage of that.

Week 11 was Questions 1 and 2

Week 12 was Questions 3 and 4

Week 13 was Question 5

Week 14 was Question 6

This week Start Question 7

Question 7

So a fractal is essentially a graph of an iterative process applied to complex numbers.

Most computer generated fractals are more than 2 colours.

The next three weeks of investigations require you to explore a region that appears interesting from your colourful zones in Question 6.

Part a) Zoom in on a range of values where you hope to explore in greater detail how this zone might be coloured.

Clearly state what zone you have chosen

Part b) **Run the iterative processes again for your smaller and refined domains/ranges.** This time as you run the procedures, you will also need to know at what iteration number z_n (the critical iteration) the point diverges if it diverges through iteration. In some cases the moduli will fluctuate up and down. The critical iteration is the point before where the moduli exceeds and then continues to climb past two. (ie, like in my example in question 4, I was able to identify that at z_5 the complex point $0.5 + 0.5i$ diverges. For this point I record 4 iterations, as 4 iterations were completed before it became larger than two and then diverged.)

Record the number of iterations required for divergence, or if it converges for a minimum grid of 60 points.