

How to Draw Fractals with C

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This set of notes assume no maths higher than GCSE level and absolutely no programming experience.

1 Elementary Math

1.1 Sets

sets can be defined by listing its elements separated by commas in curly braces ie $S = \{1, 2, 3, 4\}$

1.2 Some useful sets

\mathbb{N} the set of natural numbers $\mathbb{N} = \{0, 1, 2, 3, \dots\}$

\mathbb{Z} the set of all integers $\mathbb{Z} = \{\dots, -2, -1, 0, 1, 2, 3, \dots\}$

\mathbb{Q} the set of rational numbers $\mathbb{Q} = \{\frac{a}{b} : a, b \in \mathbb{Z}, b \neq 0\}$

\mathbb{R} the set of real numbers

\mathbb{C} the set of complex numbers $\mathbb{C} = \{a + bi : a, b \in \mathbb{R}\}$

1.3 Functions

functions map every element from one set of elements(domain) to an element of another set(codomain). for example the function $f(x) = x^2$ maps the number 2 to 4 and -3 to 9. here the domain is \mathbb{R} and the codomain is \mathbb{R}^+

1.4 Induction

2 C and the Shell

In this course we will be using the C programming language because C is the bestest!

2.1 Hello World

Type the code in the following box into your favorite text editor

```
#include <stdio.h>
```

```
int main() {
```

```
        printf("Hello, World!");  
    }
```

save as hello.c

at the command line type

```
gcc hello.c && ./a.out
```

this is really two commands, the first `gcc hello.c` compiles our source code into machine language. this outputs the file `a.out` in the same directory as the source code.

2.2 defining functions

In C functions are defined by writing the return type, the function name, and have the variables separated by commas in parentheses.

MAJOR DIFFERENCE between C functions and maths functions, C functions have SIDE EFFECTS!!!.

3 Drawing Geometry

3.1 Cartesian Geometry

3.2 Drawing dots

3.3 for loops to draw lines

4 Fractal Geometry