

Tenth homework set solutions

1. Suppose B has order 7. Then applying the Farey sequence, the orders of A and C must sum to 7, so A and C have orders 2 and 5, or 3 and 4. The other possibility is for B to belong to the principal series, so A and C have orders 6 and 8.

2. By the multiplier rule, the number of discs of order 33 attached to the main cardioid of the 3-cycle midget is the same as the number of discs of order 11 attached to the main cardioid of the Mandelbrot set.

On the upper side of the main cardioid we have

- an 11 in the principal series,
- an 11 between the 5 and 6 in the principal series,
- between the principal series 3 and 4 is a 7, and between that 7 and the 4 is an 11,
- between the principal series 2 and 3 is a 5, between that 5 and the 3 is an 8, between that 8 and the 3 is an 11, and
- between this 5 and the 2 is a 7, between that 7 and the 2 is a 9, between that 9 and the 2 is an 11.

This gives 5 above, mirrored by 5 below, so altogether 10.

3. The first few iterates are

$c = -1$: 0, -1 , 0, -1 , and so on forever. This c belongs to the Mandelbrot set.

$c = -2$: 0, -2 , 2, 2, and so on forever. This c belongs to the Mandelbrot set.

$c = 1$: 0, 1, 2, 5, and so on, larger and larger, forever. This c does not belong to the Mandelbrot set.

$c = i$: 0, i , $-1+i$, $-i$, $-1+i$, and so on forever. This c belongs to the Mandelbrot set.