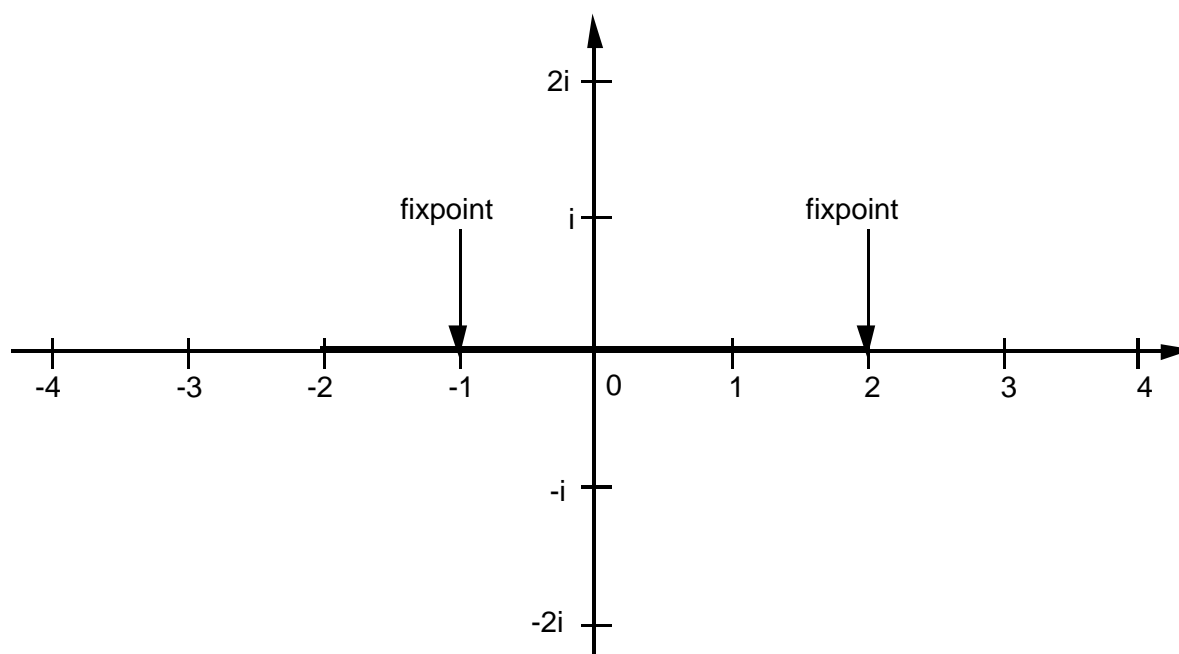


Another Special Case

The iteration formula we in fact wish to study is $z \rightarrow z^2 + c$, where "c" is a constant or *parameter* we adds at every iteration. Of cause "c", like the variable "z", may be complex, that is $c = c_{\text{real}} + ic_{\text{imag}}$. (see *Intro II The imaginary Numbers and the Complex Number Plane*). In Intro III (Complex Iteration) we studied the dynamical process $z \rightarrow z^2$, which resulted in a Julia set which in fact was the unit circle (or a filled-in Julia set which was the closed unit disc). This is in fact to be regarded as a a special case of the dynamical process $z \rightarrow z^2 + c$, where $c = 0$ (or, for being more exact, $0 + 0i$). What will the Julia set looks like if c NOT equals zero? We will in this fourth intro investigate another special case where $c = -2 + 0i$, that is we now iterate $z \rightarrow z^2 + (-2)$, that is $z \rightarrow z^2 - 2$. The resulting julia set we now receive shows up to be a straight line from -2 to +2 (including the mentioned end points).



As this simple Julia set is only a (straight) line, it does not enclose any region like the circle. Therefore in this case the Julia set is the same as the filled-in Julia set. The fixpoints (the points that do not change under iteration) we receive by simple solve the equation $z = z^2 - 2$, which has the solutions $z = 2$ and $z = -1$ as $2 = 2^2 - 2$ and $-1 = (-1)^2 - 2$. This means we under iteration of these points obtains the orbits $2 \rightarrow 2 \rightarrow 2$ etc respective $-1 \rightarrow -1 \rightarrow -1$ etc. Both fixpoints are repelling.

In other words, the shape of the Julia is entirely governed by the parameter "c". For all other values than $c = 0$ (the circle) and $c = -2$ (the closed interval between -2 and 2) the Julia set is a fractal. Now I strongly recommend the dear reader to check out article 3 in the chaotic series, *Binary decomposition, acupuncture points and secondary decorations*. That if you've read the two previous articles.

Regards
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