

```

1 # julia.py
2 import numpy as np
3 import matplotlib.pyplot as plt
4
5
6 def julia(x, y, a, b, n, thresh):
7     for i in range(n):
8         #zn = zn**2 + c
9         xn = x**2 - y**2 + a
10        yn = 2*x*y + b
11        if np.linalg.norm([xn, yn], 2) > thresh:
12            return False
13        x = xn
14        y = yn
15    return True
16
17
18 a = -0.83
19 b = 0.18
20
21 n = 2000
22 x = np.linspace(-2, 2, n)
23 y = np.linspace(-2, 2, n)
24 success = np.zeros((n, n))
25 # check if the point is in the julia set and if it is plot it on the graph
26 # 15 iterations of the function are done and it is removed from the set if the
27 # magnitude of the point is greater than 1000
28 for i in range(n):
29     for j in range(n):
30         success[j][i] = julia(x[i], y[j], a, b, 15, 1000)
31 # plot the points with a histogram
32 plt.imshow(success, cmap='afmhot', extent=[-2, 2, -2, 2])
33 plt.xlim(-2, 2)
34 plt.ylim(-2, 2)
35 plt.savefig('julia.png', dpi=800)
36

```