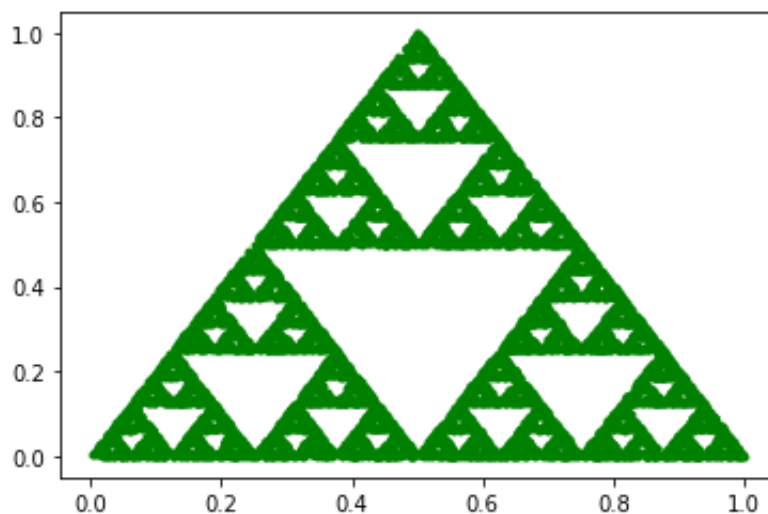


```
1 import random
2 import matplotlib.pyplot as plt
3 from matplotlib import animation
4
5
6 def plot(points):
7
8     xx = [x for (x, y) in points]
9     yy = [y for (x, y) in points]
10
11     plt.plot(xx, yy, 'g.')
12     plt.show()
13
14
15 def do_animation(points):
16
17     xx = [x for (x, y) in points]
18     yy = [y for (x, y) in points]
19
20     fig = plt.figure()
21
22     def init():
23         ax = plt.axes(xlim=(0, 1), ylim=(0, 1))
24         return ax.plot(xx, yy, 'g.')
25
26     def animate(i):
27         scale = 1 - i * 0.02
28         ax = plt.axes(xlim=(0, scale), ylim=(0, scale))
29         return ax.plot(xx, yy, 'g.')
30
31     anim = animation.FuncAnimation(
32         fig, animate, init_func=init, frames=50, interval=200,
33         anim.save('sierpinski_10000.gif', writer='pillow')
34
35     plt.show()
36
37
38 def sierpinski(n, animate=False):
39
40     vertices = [(0.0, 0.0), (0.5, 1.0), (1.0, 0.0)]
41     points = []
```

```

43 # initial vertex
44 x, y = random.choice(vertices)
45
46 for i in range(n):
47
48     # select new vertex
49     vx, vy = random.choice(vertices)
50
51     # get middle point
52     x = (vx + x) / 2.0
53     y = (vy + y) / 2.0
54
55     points.append((x, y))
56
57 if animate:
58     do_animation(points)
59 else:
60     plot(points)
61
62
63 sierpinski(n=10000, animate=False)

```



```
1 sierpinski(n=1000, animate=True)
```



```
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:28: MatplotlibWarning: The axes does not have a transform associated with it and therefore it cannot be handled by the renderer.
```

