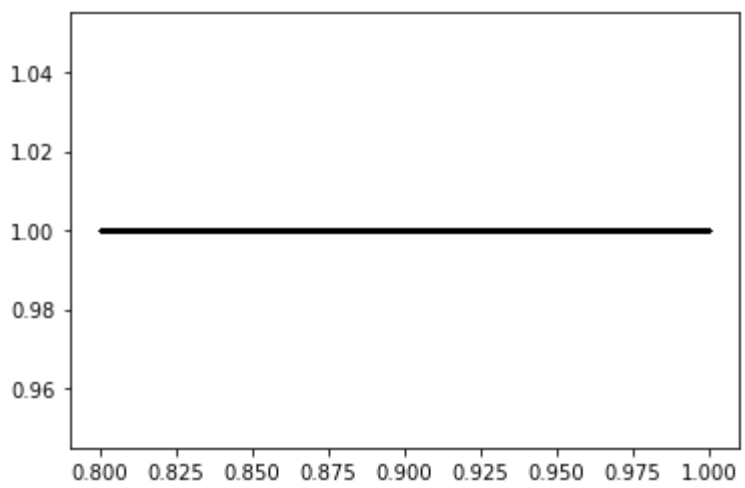
In [19]:
```
import matplotlib.pyplot as  plt
import math
def fx(n, r, x0):
    y = [x0]
    def f(x):
        y = x * (math.e** (r*(1-x)))
        return y
    for i in range(int(n)-1):
        y.append(f(y[-1]))
    g=y[-1]
    return g
def re(n,r,x0):
    a = []
    k = []
    while r <= 1:
        k.append(fx(n, r, x0))
        a.append(r)
        r += 0.0001
    return k, a
n = 700
for i in range(300):
    x, y = re(n, 0.8, 0.5)
    n += 1
    plt.plot(y, x, 'ko', markersize=0.02)
plt.show()
```



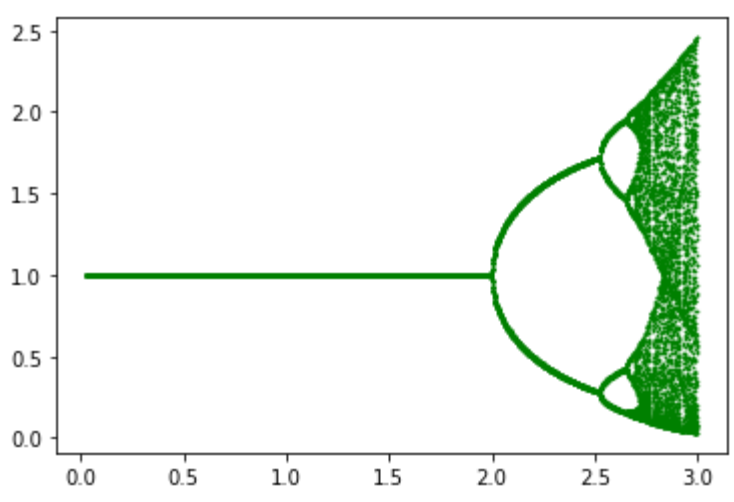
In [15]:
```
import matplotlib.pyplot as plt
import random
import math

n = 1000
R = []
step_1 = 0
for k in range(10, 1000):
    x0 = random.random()
    a = []
    a.append(x0)
    r = 0.003*k
    for i in range(1, n):
        a.append(a[i-1]*math.exp(r*(1-a[i-1])))
    for i in range(950, n - 2**step_1, 2**step_1):
        if round(a[i], 2) != round(a[i + 2**step_1], 2):
            print(r)
            R.append(r)
            step_1 += 1
            plt.scatter(r, a[i], s=0.5, color='yellow')
            break
    plt.scatter([r] * 50, y=a[950:], s=0.5, color='green')

for i in range(0, len(R)-3):
    print('delta', (R[i+1]-R[i])/(R[i+2]-R[i+1]))

plt.show()
```

```
1.998
2.5260000000000002
2.658
2.685
2.694
2.697
delta 4.0000000000000115
delta 4.888888888888852
delta 3.0000000000000493
```



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