

生物种群作业

1、程序源代码

```
import numpy as np
import matplotlib.pyplot as plt

def f(x, b1): # 定义差分方程
    return b1 * x * (1 - x)

def converge(b): # 定义函数来计算收敛点
    converge_points = [] # 计算不同 b 值的收敛点
    x = 0.2
    count = 0
    cover = []
    converge_points.append(b)
    for i in range(100):
        x = f(x, b)
        cover.append(x)
    for i in range(98, -1, -1):
        if round(cover[99], 2) == round(cover[i], 2):
            count = 99 - i
            break
    for i in range(count):
        converge_points.append(round(cover[99 - i], 4)) # 计算不同 b 值的收敛点
    plt.plot(b, round(cover[99 - i], 4), 'b.') # 绘制收敛点关于 b 的取值图
    print(converge_points) # 输出收敛点

b_range = np.arange(2.5, 3.501, 0.01) # b 取值范围和间隔
for i in b_range:
    converge(round(i, 2))

plt.xticks(np.arange(2.5, 3.5, 0.15))
plt.yticks(np.arange(0, 1, 0.1))
plt.title('Converge points vs b')
plt.xlabel('b')
plt.ylabel('Converge point')
plt.show()
```

2、列表记录对应 b 的不同取值的收敛点

[2. 5, 0. 6]

[2. 51, 0. 6016]

[2. 52, 0. 6032]

[2. 53, 0. 6047]

[2. 54, 0. 6063]

[2. 55, 0. 6078]

[2. 56, 0. 6094]

[2. 57, 0. 6109]

[2. 58, 0. 6124]

[2. 59, 0. 6139]

[2. 6, 0. 6154]

[2. 61, 0. 6169]

[2. 62, 0. 6183]

[2. 63, 0. 6198]

[2. 64, 0. 6212]

[2. 65, 0. 6226]

[2. 66, 0. 6241]

[2. 67, 0. 6255]

[2. 68, 0. 6269]

[2. 69, 0. 6283]

[2. 7, 0. 6296]

[2. 71, 0. 631]

[2. 72, 0. 6324]

[2. 73, 0. 6337]

[2. 74, 0. 635]

[2. 75, 0. 6364]

[2. 76, 0. 6377]

[2. 77, 0. 639]

[2. 78, 0. 6403]
[2. 79, 0. 6416]
[2. 8, 0. 6429]
[2. 81, 0. 6441]
[2. 82, 0. 6454]
[2. 83, 0. 6466]
[2. 84, 0. 6479]
[2. 85, 0. 6491]
[2. 86, 0. 6503]
[2. 87, 0. 6516]
[2. 88, 0. 6528]
[2. 89, 0. 654]
[2. 9, 0. 6552]
[2. 91, 0. 6564]
[2. 92, 0. 6576]
[2. 93, 0. 6587]
[2. 94, 0. 66]
[2. 95, 0. 6614]
[2. 96, 0. 6631]
[2. 97, 0. 6656, 0. 6609]
[2. 98, 0. 67, 0. 6587]
[2. 99, 0. 6775, 0. 653]
[3. 0, 0. 6886, 0. 6431]
[3. 01, 0. 7012, 0. 6305]
[3. 02, 0. 7127, 0. 6183]
[3. 03, 0. 7224, 0. 6076]
[3. 04, 0. 7306, 0. 5984]
[3. 05, 0. 7377, 0. 5902]
[3. 06, 0. 744, 0. 5828]

[3.07, 0.7498, 0.5759]
[3.08, 0.7551, 0.5696]
[3.09, 0.76, 0.5636]
[3.1, 0.7646, 0.558]
[3.11, 0.7689, 0.5527]
[3.12, 0.7729, 0.5476]
[3.13, 0.7768, 0.5427]
[3.14, 0.7805, 0.538]
[3.15, 0.784, 0.5335]
[3.16, 0.7873, 0.5291]
[3.17, 0.7905, 0.5249]
[3.18, 0.7936, 0.5208]
[3.19, 0.7966, 0.5169]
[3.2, 0.7995, 0.513]
[3.21, 0.8022, 0.5093]
[3.22, 0.8049, 0.5057]
[3.23, 0.8075, 0.5021]
[3.24, 0.81, 0.4986]
[3.25, 0.8124, 0.4953]
[3.26, 0.8148, 0.492]
[3.27, 0.8171, 0.4887]
[3.28, 0.8193, 0.4856]
[3.29, 0.8215, 0.4825]
[3.3, 0.8236, 0.4794]
[3.31, 0.8257, 0.4765]
[3.32, 0.8277, 0.4735]
[3.33, 0.8296, 0.4707]
[3.34, 0.8315, 0.4679]
[3.35, 0.8334, 0.4651]

[3.36, 0.8352, 0.4624]
 [3.37, 0.837, 0.4597]
 [3.38, 0.8388, 0.4571]
 [3.39, 0.8405, 0.4545]
 [3.4, 0.8422, 0.452]
 [3.41, 0.8438, 0.4495]
 [3.42, 0.8454, 0.447]
 [3.43, 0.8469, 0.4445]
 [3.44, 0.8482, 0.4415]
 [3.45, 0.8469, 0.4327]
 [3.46, 0.8392, 0.4137, 0.8612, 0.4667]
 [3.47, 0.8348, 0.4029, 0.8659, 0.4786]
 [3.48, 0.8317, 0.3951, 0.8694, 0.4872]
 [3.49, 0.8291, 0.3885, 0.8724, 0.4944]
 [3.5, 0.8269, 0.3828, 0.875, 0.5009]

3、收敛点关于 b 的取值图

