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**

