

用matlab求 $x_{k+1} = bx_k(1 - x_k)$ ，初值 $x_0 = 0.2$ ，取 $b = [2.5, 3.5]$,间隔0.01取值，计算差分方程的收敛点

```
% 设置参数
b_start = 2.5; % b的起始值
b_end = 3.5; % b的终止值
b_step = 0.01; % b的步长
n = 1000; % 迭代次数
x0 = 0.2; % 初始值

% 创建迭代函数
f = @(x,b) b*x*(1-x);

% 初始化矩阵
B = b_start:b_step:b_end;
X = zeros(length(B), n);

% 计算收敛点
for i = 1:length(B)
    x = x0;
    for j = 1:n
        x = f(x, B(i));
        X(i, j) = x;

        % 当b>3.3时，计算迭代2次，绘制两个收敛点
        if B(i) >= 3 && j == n
            x1 = x;
        end

        % 当b>3.45时，计算迭代4次，绘制四个收敛点
        if B(i) >= 3.45 && j == n-3
            x2 = x;
            x3 = f(x2, B(i));
            x4 = f(x3, B(i));
        end
    end
    % 存储最终的收敛点
    if B(i) >= 3 && j == n
        X(i, n) = x1;
    end
    if B(i) >= 3.45 && j == n-3
        X(i, n-1) = x2;
        X(i, n-2) = x3;
        X(i, n-3) = x4;
    end
end

% 绘制收敛点图
plot(B, X(:, end), 'b.')
hold on
if max(B) >= 3
    plot(B, X(:, end-1), 'r.')
```

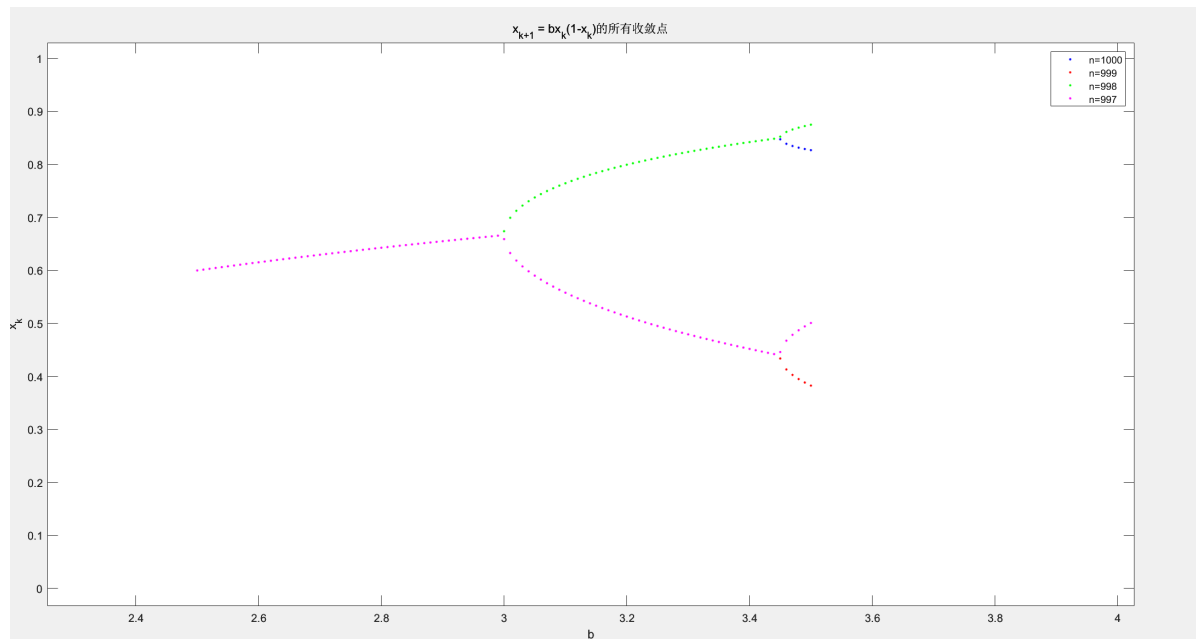
```

end
if max(B) >= 3.45
    plot(B, X(:, end-2), 'g.')
    plot(B, X(:, end-3), 'm.')
end
hold off

title('x_{k+1} = bx_k(1-x_k)的所有收敛点')
xlabel('b')
ylabel('x_k')
legend('n=1000', 'n=999', 'n=998', 'n=997')

```

并作出收敛点关于b的取值的图像



```

% 提取最后四个点
points = [B', X(:, end-3:end)];
% 将点导出到csv文件
writematrix(points, 'points.csv');

```

加上以上代码可以导出图像对应表格，记录不同b值对应的收敛点。

B	C	D	E	F	G	H	I
b	xk	xk-1	xk-2	xk-3	(k取决于迭代次数)		
2.5	0.6	0.6	0.6	0.6			
2.51	0.601593625	0.601593625	0.601593625	0.601593625			
2.52	0.603174603	0.603174603	0.603174603	0.603174603			
2.53	0.604743083	0.604743083	0.604743083	0.604743083			
2.54	0.606299213	0.606299213	0.606299213	0.606299213			
2.55	0.607843137	0.607843137	0.607843137	0.607843137			
2.56	0.609375	0.609375	0.609375	0.609375			
2.57	0.610894942	0.610894942	0.610894942	0.610894942			
2.58	0.612403101	0.612403101	0.612403101	0.612403101			
2.59	0.613899614	0.613899614	0.613899614	0.613899614			
2.6	0.615384615	0.615384615	0.615384615	0.615384615			
2.61	0.616858238	0.616858238	0.616858238	0.616858238			
2.62	0.618320611	0.618320611	0.618320611	0.618320611			
2.63	0.619771863	0.619771863	0.619771863	0.619771863			
2.64	0.621212121	0.621212121	0.621212121	0.621212121			
2.65	0.622641509	0.622641509	0.622641509	0.622641509			
2.66	0.62406015	0.62406015	0.62406015	0.62406015			
2.67	0.625468165	0.625468165	0.625468165	0.625468165			
2.68	0.626865672	0.626865672	0.626865672	0.626865672			
2.69	0.628252788	0.628252788	0.628252788	0.628252788			
2.7	0.62962963	0.62962963	0.62962963	0.62962963			
2.71	0.63099631	0.63099631	0.63099631	0.63099631			
2.72	0.632352941	0.632352941	0.632352941	0.632352941			
2.73	0.633699634	0.633699634	0.633699634	0.633699634			
2.74	0.635036496	0.635036496	0.635036496	0.635036496			
2.75	0.636363636	0.636363636	0.636363636	0.636363636			
2.76	0.637681159	0.637681159	0.637681159	0.637681159			
2.77	0.63898917	0.63898917	0.63898917	0.63898917			
2.78	0.64028777	0.64028777	0.64028777	0.64028777			
2.79	0.641577061	0.641577061	0.641577061	0.641577061			
2.8	0.642857143	0.642857143	0.642857143	0.642857143			
2.81	0.644128114	0.644128114	0.644128114	0.644128114			
2.82	0.645390071	0.645390071	0.645390071	0.645390071			
2.83	0.64664311	0.64664311	0.64664311	0.64664311			

	B	C	D	E	F	G	
	2.82	0.645390071	0.645390071	0.645390071	0.645390071		
	2.83	0.64664311	0.64664311	0.64664311	0.64664311		
	2.84	0.647887324	0.647887324	0.647887324	0.647887324		
	2.85	0.649122807	0.649122807	0.649122807	0.649122807		
	2.86	0.65034965	0.65034965	0.65034965	0.65034965		
	2.87	0.651567944	0.651567944	0.651567944	0.651567944		
	2.88	0.652777778	0.652777778	0.652777778	0.652777778		
	2.89	0.653979239	0.653979239	0.653979239	0.653979239		
	2.9	0.655172414	0.655172414	0.655172414	0.655172414		
	2.91	0.656357388	0.656357388	0.656357388	0.656357388		
	2.92	0.657534247	0.657534247	0.657534247	0.657534247		
	2.93	0.658703072	0.658703072	0.658703072	0.658703072		
	2.94	0.659863946	0.659863946	0.659863946	0.659863946		
	2.95	0.661016949	0.661016949	0.661016949	0.661016949		
	2.96	0.662162162	0.662162162	0.662162162	0.662162162		
	2.97	0.663299663	0.663299663	0.663299663	0.663299663		
	2.98	0.66442953	0.66442953	0.66442953	0.66442953		
	2.99	0.665550453	0.665553212	0.665550481	0.665553185		
	3	0.659160185	0.674004106	0.659167713	0.673996917		
	3.01	0.632848863	0.699377051	0.632848863	0.699377051		
	3.02	0.618617726	0.712508102	0.618617726	0.712508102		
	3.03	0.607639146	0.722393857	0.607639146	0.722393857		
	3.04	0.598356081	0.730591287	0.598356081	0.730591287		
	3.05	0.590163934	0.737704918	0.590163934	0.737704918		
	3.06	0.582751878	0.744045508	0.582751878	0.744045508		
	3.07	0.575934813	0.749798086	0.575934813	0.749798086		
	3.08	0.569591839	0.755083486	0.569591839	0.755083486		
	3.09	0.563638762	0.759985834	0.563638762	0.759985834		
	3.1	0.558014125	0.76456652	0.558014125	0.76456652		
	3.11	0.552671412	0.768871997	0.552671412	0.768871997		
	3.12	0.547574386	0.772938435	0.547574386	0.772938435		
	3.13	0.542694153	0.776794665	0.542694153	0.776794665		
	3.14	0.538007221	0.780464117	0.538007221	0.780464117		
	3.15	0.533494176	0.783966142	0.533494176	0.783966142		
	3.16	0.529138746	0.78731695	0.529138746	0.78731695		
	3.17	0.52402712	0.790520282	0.52402712	0.790520282		

	B	C	D	E	F	G
	3.16	0.529138746	0.78731695	0.529138746	0.78731695	
	3.17	0.52492713	0.790530283	0.52492713	0.790530283	
	3.18	0.520847494	0.793617915	0.520847494	0.793617915	
	3.19	0.516889599	0.796590025	0.516889599	0.796590025	
	3.2	0.51304451	0.79945549	0.51304451	0.79945549	
	3.21	0.509304374	0.802222106	0.509304374	0.802222106	
	3.22	0.505662243	0.804896764	0.505662243	0.804896764	
	3.23	0.50211193	0.807485593	0.50211193	0.807485593	
	3.24	0.498647899	0.809994077	0.498647899	0.809994077	
	3.25	0.495265168	0.812427139	0.495265168	0.812427139	
	3.26	0.491959238	0.814789228	0.491959238	0.814789228	
	3.27	0.488726023	0.817084375	0.488726023	0.817084375	
	3.28	0.485561803	0.819316246	0.485561803	0.819316246	
	3.29	0.482463175	0.821488193	0.482463175	0.821488193	
	3.3	0.47942702	0.823603283	0.47942702	0.823603283	
	3.31	0.476450465	0.825664338	0.476450465	0.825664338	
	3.32	0.473530862	0.827673957	0.473530862	0.827673957	
	3.33	0.470665758	0.829634542	0.470665758	0.829634542	
	3.34	0.467852879	0.831548319	0.467852879	0.831548319	
	3.35	0.465090109	0.833417353	0.465090109	0.833417353	
	3.36	0.462375479	0.835243569	0.462375479	0.835243569	
	3.37	0.459707147	0.837028758	0.459707147	0.837028758	
	3.38	0.457083391	0.838774597	0.457083391	0.838774597	
	3.39	0.454502597	0.840482654	0.454502597	0.840482654	
	3.4	0.451963248	0.842154399	0.451963248	0.842154399	
	3.41	0.449463916	0.843791216	0.449463916	0.843791216	
	3.42	0.447003259	0.845394402	0.447003259	0.845394402	
	3.43	0.444580008	0.846965182	0.444580008	0.846965182	
	3.44	0.442192963	0.848504712	0.442192963	0.848504712	
	3.45	0.446079929	0.85246956	0.433889973	0.847421652	
	3.46	0.467486178	0.861342266	0.413233914	0.838951896	
	3.47	0.478561245	0.865905118	0.402913653	0.834792617	
	3.48	0.48715928	0.869426203	0.395064495	0.831680119	
	3.49	0.494446226	0.872392353	0.388520535	0.829127427	
	3.5	0.50088421	0.874997264	0.382819683	0.826940707	

至此，完成了这个作业的要求，感谢老师。