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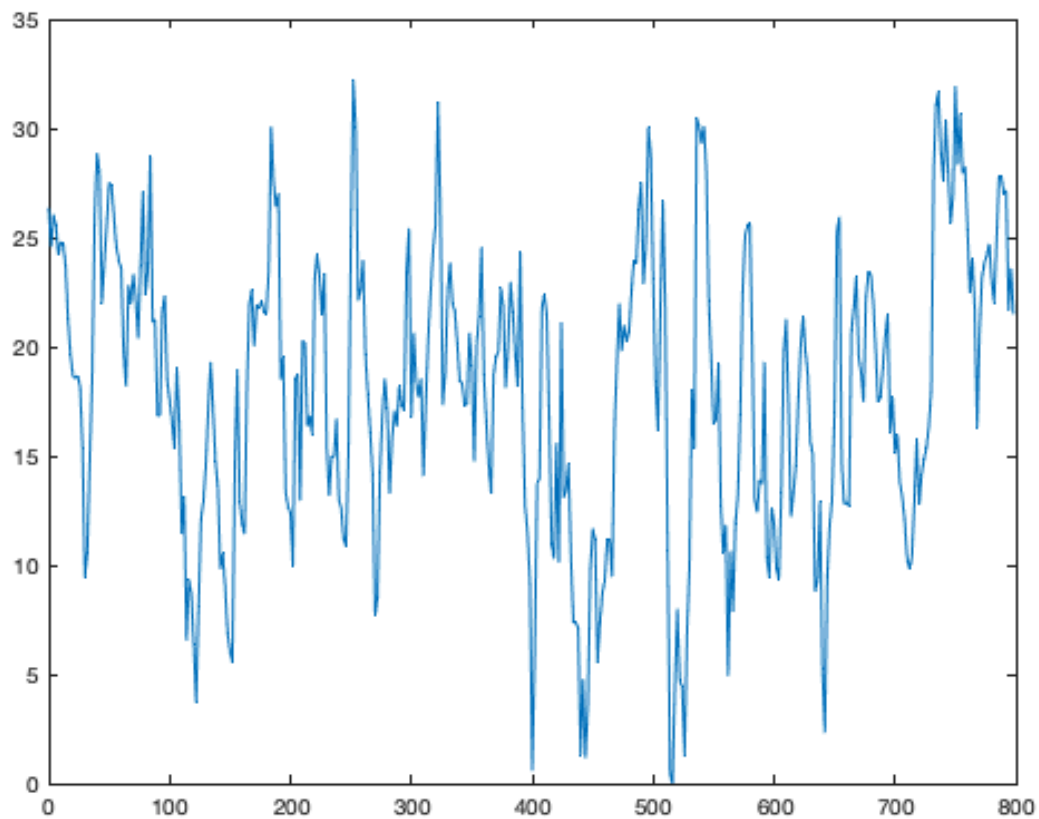
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HW 4

```
close all; clear all
```

Problem 1

```
D = load('DevonBdot.txt');
dist = D(:,1);
bdot = D(:,2);
figure(1);clf;
clear D2 D4
plot(dist, bdot);
D1 = D(1:100,:);
D2 = D(101:200,:);
D3 = D(201:300,:);
D4 = D(301:400,:);
D1_mu = mean(D1);
D2_mu = mean(D2);
D3_mu = mean(D3);
D4_mu = mean(D4);
D1_sig = std(D1);
D2_sig = std(D2);
D3_sig = std(D3);
D4_sig = std(D4);
%calculate vairance for rates
D1_var = var(D1);
D2_var = var(D2);
D3_var = var(D3);
D4_var = var(D4);
```



plot relative density plots

```
figure(1); clf
subplot(2,2,1);
x0 = 15; %define number of bins ;
[distr, xbins]= hist(D1(:,2), x0);
dx = xbins(2) -xbins(1); %bin width by subtracting bin centers (xbins)
distr_area = sum(distr*dx);
norm =distr/distr_area;
bar(xbins, norm); hold on %plot the relative density histogram problem

% kernel density histogram
h = 1;
xm = D1_mu(2)-10*D1_sig(2):D1_sig(2)/10:D1_mu(2)+10*D1_sig(2);
for n=1:length(xm)

    dist = D1(:,2)-xm(n); %distance from x0 to all other data
    Ix = find(abs(dist)<h) % finding data within window h
    w =15/16*(1-dist(Ix)/h).^2
    f1(n) = sum(w); %store the estiamte for each position in our array
end
dw = D1_sig(2)/10; %width of bins
```

```

f1 = 1/sum(f1.*dw)*f1 ;%normalizes the pdf

plot(xm, f1, 'r', 'linewidth', 2)
title( '0m-200m')
% section2
subplot(2,2,2);
x0 = 15; %define number of bins ;
[distr, xbins]= hist(D2(:,2), x0);
dx = xbins(2) -xbins(1); %bin width by subtracting bin centers (xbins)
distr_area = sum(distr*dx);
norm =distr/distr_area;
bar(xbins, norm); hold on %plot the relative density histogram problem

% kernal density histogram
h = 1;
xm = D2_mu(2)-10*D2_sig(2):D2_sig(2)/10:D2_mu(2)+10*D2_sig(2);
for n=1:length(xm)

    dist = D2(:,2)-xm(n); %distance from x0 to all other data
    Ix = find(abs(dist)<h) % finding data within window h
    w =15/16*(1-dist(Ix)/h).^2
    f1(n) = sum(w); %store the estiamte for each position in our array
end
dw = D2_sig(2)/10; %width of bins
f1 = 1/sum(f1.*dw)*f1 ;%normalizes the pdf

plot(xm, f1, 'r', 'linewidth', 2)
title( '200m-400m')
%Section 3
subplot(2,2,3);
x0 = 15; %define number of bins ;
[distr, xbins]= hist(D3(:,2), x0);
dx = xbins(2) -xbins(1); %bin width by subtracting bin centers (xbins)
distr_area = sum(distr*dx);
norm =distr/distr_area;
bar(xbins, norm); hold on %plot the relative density histogram problem

% kernal density histogram
h = 1;
xm = D3_mu(2)-10*D3_sig(2):D3_sig(2)/10:D3_mu(2)+10*D3_sig(2);
for n=1:length(xm)

    dist = D3(:,2)-xm(n); %distance from x0 to all other data
    Ix = find(abs(dist)<h) % finding data within window h
    w =15/16*(1-dist(Ix)/h).^2
    f1(n) = sum(w); %store the estiamte for each position in our array
end
dw = D3_sig(2)/10; %width of bins
f1 = 1/sum(f1.*dw)*f1 ;%normalizes the pdf

plot(xm, f1, 'r', 'linewidth', 2)
title( '400m-600m')
%Section4
subplot(2,2,4);

```

```

x0 = 15; %define number of bins ;
[distr, xbins]= hist(D4(:,2), x0);
dx = xbins(2) -xbins(1); %bin width by subtracting bin centers (xbins)
distr_area = sum(distr*dx);
norm =distr/distr_area;
bar(xbins, norm); hold on %plot the relative density histogram problem

% kernal density histogram
h = 1;
xm = D4_mu(2)-10*D4_sig(2):D4_sig(2)/10:D4_mu(2)+10*D4_sig(2);
for n=1:length(xm)

    dist = D4(:,2)-xm(n); %distance from x0 to all other data
    Ix = find(abs(dist)<h) % finding data within window h
    w =15/16*(1-dist(Ix)/h).^2
    f1(n) = sum(w); %store the estiamte for each position in our array
end
dw = D4_sig(2)/10; %width of bins
f1 = 1/sum(f1.*dw)*f1 ;%normalizes the pdf

plot(xm, f1, 'r', 'linewidth', 2)
title( '600m-800m')

Ix =

    0x1 empty double column vector

w =

    0x1 empty double column vector

Ix =

    0x1 empty double column vector

w =

    0x1 empty double column vector

Ix =

    0x1 empty double column vector

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w =

0×1 empty double column vector

Ix =

62

w =

0.1942

Ix =

62

w =

1.0984

Ix =

62

w =

2.7404

Ix =

76

77

$w =$

0.0006
0.2498

$Ix =$

58
61
76
77

$w =$

0.0163
0.0793
0.3987
1.2257

$Ix =$

58
61
75
76
77

$w =$

0.5403
0.7903
0.1708
1.5345
2.9395

$Ix =$

58
61
75
76

$w =$

1.8021
2.2390
1.0416
3.4082

$Ix =$

63
75

$w =$

0.2049
2.6503

$Ix =$

60
63
74

$w =$

0.2365
1.1236
0.0426

$Ix =$

16
59
60
63
74

$w =$

0.1143
0.2153
1.1961
2.7801
0.6623

$Ix =$

16
59
60
72
74

$w =$

0.8939
1.1479
2.8935
0.3548
2.0198

$Ix =$

16
17
59
72
73

$w =$

2.4113
0.2260
2.8182
1.4473
0.2534

$Ix =$

17
56
72
73
82

$w =$

1.1725
0.0662
3.2775
1.2339
0.0736

$Ix =$

17
56
64
73
81
82

$w =$

2.8567
0.7476
0.0373
2.9521
0.1512
0.7720

$Ix =$

56
64
65
80
81
82
100

$w =$

2.1668
0.6406
0.0020
0.0020
0.9926
2.2082
0.0880

$Ix =$

57
64
65
71
80
81
99
100

$w =$

0.1834
1.9818
0.4253
0.0062
0.4253
2.5717

0.0477
0.8173

$I_x =$

57
65
71
80
99
100

$w =$

1.0726
1.5864
0.4704
1.5864
0.6819
2.2843

$I_x =$

18
57
65
66
70
71
78
80
99

$w =$

0.0004
2.6995
3.4853
0.0466
0.0081
1.6724
0.0108
3.4853
2.0539

$I_x =$

15
18

53
66
70
71
78

$w =$

0.0091
0.3935
0.0091
0.6777
0.4862
3.6122
0.5059

$Ix =$

15
18
53
66
70
78

$w =$

0.4942
1.5244
0.4942
2.0465
1.7021
1.7388

$Ix =$

15
18
52
53
55
70
78

$w =$

1.7170
3.3931
0.0062

1.7170
0.0115
3.6557
3.7094

$Ix =$

15
46
47
52
53
55
67
69

$w =$

3.6776
0.2406
0.2406
0.4711
3.6776
0.5103
0.0334
0.0711

$Ix =$

46
47
51
52
55
67
69

$w =$

1.2053
1.2053
0.1586
1.6738
1.7470
0.6242
0.7639

$Ix =$

12
14
33
46
47
50
51
52
55
67
69
83
97

$w =$

0.0029
0.1632
0.1632
2.9078
2.9078
0.0092
1.0113
3.6143
3.7215
1.9528
2.1944
0.1632
0.0092

$Ix =$

11
12
13
14
19
33
50
51
54
79
83
97

$w =$

0.2869
0.4376
0.2869
1.0228

0.3667
1.0228
0.4949
2.6018
0.0345
0.0585
1.0228
0.4949

$Ix =$

10
11
12
13
14
19
32
33
50
54
68
79
83
97
98

$w =$

0.0367
1.3064
1.6101
1.3064
2.6202
1.4712
0.0043
2.6202
1.7184
0.6291
0.2930
0.7210
2.6202
1.7184
0.1008

$Ix =$

10
11
12
13

19
32
38
50
54
68
79
86
97
98

$w =$

0.6382
3.0637
3.5204
3.0637
3.3135
0.4529
0.0099
3.6797
1.9615
1.3195
2.1214
0.2017
3.6797
0.8553

$Ix =$

10
32
38
68
86
98

$w =$

1.9775
1.6392
0.4993
3.0837
1.1161
2.3475

$Ix =$

9
32

38
44
45
48
86
90
91

$w =$

0.2120
3.5633
1.7266
0.3439
0.2386
0.0123
2.7682
0.0123
0.0560

$Ix =$

9
23
35
37
38
44
45
48
49
84
87
88
89
90
91

$w =$

1.1403
0.1356
0.1356
0.0208
3.6916
1.4251
1.2008
0.5156
0.0003
0.1570
0.2173

0.3506
0.0587
0.5156
0.7123

$Ix =$

9
23
34
35
37
41
44
45
48
49
84
85
87
88
89
90
91

$w =$

2.8063
0.9518
0.0225
0.9518
0.5651
0.3574
3.2441
2.9009
1.7567
0.3916
1.0072
0.1398
1.1525
1.4388
0.7220
1.7567
2.1064

$Ix =$

23
31
34
35

36
37
41
42
48
49
84
85
87
88
89
90
92

$w =$

2.5058
0.0009
0.5737
2.5058
0.0794
1.8471
1.4525
0.0243
3.7356
1.5207
2.5952
0.9630
2.8255
3.2647
2.1230
3.7356
0.0243

$Ix =$

5
8
24
30
31
34
36
39
41
42
49
85
92

$w =$

0.0013
0.2614
0.1485
0.0826
0.4060
1.8627
0.7904
0.2614
3.2853
0.5824
3.3876
2.5239
0.5824

$Ix =$

2
5
6
7
8
24
29
30
31
36
39
42
92

$w =$

0.0859
0.4133
0.0048
0.0280
1.2514
0.9855
0.0859
0.8006
1.5490
2.2393
1.2514
1.8783
1.8783

$Ix =$

2
5

6
7
8
24
29
30
31
39

$w =$

0.8109
1.5632
0.4578
0.5999
2.9791
2.5603
0.8109
2.2564
3.4297
2.9791

$Ix =$

2
3
4
5
6
7
20
25
28
29

$w =$

2.2736
0.0065
0.3096
3.4508
1.6486
1.9097
0.0427
0.3096
0.0427
2.2736

$Ix =$

1
3
4
6
20
25
28
95

$w =$

0.1471
0.4734
1.3543
3.5771
0.6625
1.3543
0.6625
0.1144

$Ix =$

1
3
4
20
25
28
40
95
96

$w =$

0.9819
1.6780
3.1368
2.0201
3.1368
2.0201
0.0605
0.8941
0.1183

$Ix =$

1
3
26
27

40
94
95
96

$w =$

2.5545
3.6204
0.2261
0.3618
0.7282
0.1760
2.4116
0.9049

$Ix =$

22
26
27
40
94
96

$w =$

0.3519
1.1727
1.4613
2.1336
1.0546
2.4294

$Ix =$

21
22
26
27
43
94

$w =$

0.1513
1.4413
2.8570
3.2986

0.2652
2.6710

$Ix =$

21
22
43

$w =$

0.9928
3.2686
1.2596

$Ix =$

21
43
93

$w =$

2.5720
2.9918
0.1835

$Ix =$

93

$w =$

1.0728

$Ix =$

93

$w =$

2.6999

$Ix =$

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$Ix =$

36

$w =$

0.0958

$Ix =$

36

$w =$

0.5771

$Ix =$

36

37

$w =$

1.4637

0.1477

$Ix =$

36

37

100

$w =$

2.7556

0.6963

0.0042

$Ix =$

37

100

$w =$

1.6502

0.2653

$Ix =$

2

37

100

$w =$

0.1034
3.0094
0.9316

$Ix =$

2
100

$w =$

0.5955
2.0032

$Ix =$

2
23
24
100

$w =$

1.4930
0.0011
0.1256
3.4801

$Ix =$

2
23
24
99

$w =$

2.7957
0.2330
0.6472
0.0306

$Ix =$

23
24
99

$w =$

0.8702
1.5742
0.3906

$Ix =$

1
22
23
24
99

$w =$

0.0431
0.0067
1.9127
2.9064
1.1560

$Ix =$

1
5
21
22
23
98
99

$w =$

0.4327
0.0196
0.0032
0.2829
3.3604
0.0949
2.3266

$Ix =$

1
5
17
21
22
42
84
98

$w =$

1.2276
0.3484
0.1447
0.2563
0.9644
0.0798
0.0798
0.5748

$Ix =$

1
5
17
21
22
42
84
98

$w =$

2.4277
1.0825
0.6898
0.9148
2.0512
0.5367
0.5367
1.4600

$Ix =$

5
17
21
22

35
38
42
56
84
98

$w =$

2.2218
1.6401
1.9785
3.5432
0.1276
0.0535
1.3989
0.1593
1.3989
2.7505

$Ix =$

17
19
21
35
38
42
56
77
83
84

$w =$

2.9958
0.0001
3.4476
0.6518
0.4643
2.6663
0.7214
0.0423
0.1293
2.6663

$Ix =$

18
19

25
35
38
56
77
83

$w =$

0.1632
0.2116
0.0029
1.5813
1.2805
1.6887
0.4301
0.6557

$Ix =$

16
18
19
25
35
38
43
56
77
83

$w =$

0.1887
0.7296
0.8283
0.2544
2.9161
2.5019
0.0239
3.0612
1.2232
1.5874

$Ix =$

8
10
16
18

19
25
34
43
45
77
83

$w =$

0.0000
0.1245
0.7824
1.7012
1.8503
0.9110
0.0650
0.3656
0.0000
2.4216
2.9243

$Ix =$

8
10
16
18
19
20
25
34
43
45
51
82

$w =$

0.2054
0.6448
1.7814
3.0781
3.2776
0.0107
1.9730
0.4971
1.1127
0.2054
0.0011
0.0662

$Ix =$

8
9
10
16
20
25
34
39
41
43
44
45
48
51
82
97

$w =$

0.8160
0.1828
1.5703
3.1856
0.3064
3.4403
1.3345
0.1828
0.0061
2.2650
0.0415
0.8160
0.0309
0.2338
0.5005
0.0061

$Ix =$

8
9
10
20
34
39
41
44
45
47

48
51
54
57
64
73
74
82
97

$w =$

1.8319
0.7704
2.9012
1.0074
2.5771
0.7704
0.2787
0.4276
1.8319
0.1616
0.3917
0.8718
0.0027
0.0317
0.1616
0.1616
0.1399
1.3400
0.2787

$Ix =$

8
9
20
33
39
41
44
45
47
48
51
54
57
64
73
74
82
90

95
97

$w =$

3.2531
1.7633
2.1136
0.1417
1.7633
0.9567
1.2189
3.2531
0.7262
1.1579
1.9151
0.2524
0.3948
0.7262
0.7262
0.6793
2.5848
0.0068
0.0007
0.9567

$Ix =$

3
9
20
33
39
40
41
44
46
47
48
51
53
54
55
57
64
71
72
73
74
85
90
95

$w =$

0.0240
3.1615
3.6252
0.6833
3.1615
0.0161
2.0399
2.4155
0.2014
1.6960
2.3293
3.3636
0.1043
0.9073
0.0161
1.1631
1.6960
0.0506
0.1231
1.6960
1.6239
0.0000
0.2838
0.2273
2.0399

$Ix =$

3
4
33
40
41
46
47
53
54
55
57
64
65
71
72
73
74
76
81
85

90
95
97

$w =$

0.3662
0.1675
1.6301
0.3331
3.5284
0.8081
3.0712
0.5976
1.9675
0.3331
2.3366
3.0712
0.1058
0.4557
0.6416
3.0712
2.9739
0.0000
0.1562
0.2036
0.9661
0.8592
3.5284

$Ix =$

3
4
33
40
46
53
54
55
65
71
72
76
81
85
86
90
95

$w =$

1.1136
0.7385
2.9822
1.0553
1.8201
1.4962
3.4330
1.0553
0.6013
1.2662
1.5654
0.2058
0.7147
0.8125
0.0058
2.0537
1.8964

$Ix =$

3
4
32
40
46
53
55
65
71
72
76
81
85
86
87
90
94
95

$w =$

2.2663
1.7149
0.1600
2.1828
3.2373
2.8000
2.1828
1.5021
2.4818
2.8945

0.8168
1.6784
1.8266
0.2767
0.0751
3.5465
0.1832
3.3388

$Ix =$

4
6
7
32
40
55
58
65
70
76
78
81
85
86
87
91
94

$w =$

3.0965
0.0618
0.1402
0.7228
3.7156
3.7156
0.0006
2.8081
0.1402
1.8331
0.1402
3.0475
3.2460
0.9528
0.5246
0.1853
0.7712

$Ix =$

6
7
32
52
58
70
75
76
78
86
87
91
94

$w =$

0.4882
0.6800
1.6909
0.1217
0.2255
0.6800
0.1217
3.2547
0.6800
2.0343
1.3793
0.7754
1.7645

$Ix =$

6
7
14
32
52
58
70
75
78
79
86
87
91
94

$w =$

1.3199
1.6251

0.0002
3.0643
0.6385
0.8556
1.6251
0.6385
1.6251
0.0051
3.5210
2.6393
1.7709
3.1630

$Ix =$

6
7
14
52
58
69
70
75
78
79
89
91
93

$w =$

2.5568
2.9754
0.2168
1.5605
1.8910
0.0886
2.9754
1.5605
2.9754
0.2721
0.0055
3.1716
0.1251

$Ix =$

14
29
52
58

68
69
75
79
89
93

$w =$

0.8387
0.0741
2.8878
3.3316
0.1370
0.5593
2.8878
0.9443
0.2746
0.6462

$Ix =$

14
29
30
59
66
68
69
79
88
89
93

$w =$

1.8658
0.5217
0.0608
0.0754
0.1604
0.6728
1.4353
2.0218
0.0221
0.9490
1.5725

$Ix =$

11
13
14
29
30
59
66
68
69
79
88
89
92
93

$w =$

0.0320
0.0090
3.2982
1.3747
0.4854
0.5252
0.7236
1.6139
2.7165
3.5046
0.3585
2.0287
0.1204
2.9042

$Ix =$

11
13
15
29
30
49
59
66
68
88
89
92

$w =$

0.3959
0.2973

0.2001
2.6329
1.3153
0.1033
1.3803
1.6921
2.9603
1.1003
3.5136
0.6353

$Ix =$

11
12
13
15
30
31
49
59
66
67
88
92

$w =$

1.1649
0.0019
0.9908
0.8054
2.5505
0.0717
0.5952
2.6407
3.0658
0.1550
2.2473
1.5556

$Ix =$

11
12
13
15
31
49
60
67

80
92
96

$w =$

2.3393
0.2441
2.0895
1.8160
0.5154
1.4924
0.0730
0.7121
0.0208
2.8811
0.1355

$Ix =$

12
13
15
26
31
49
60
67
80
96

$w =$

0.8915
3.5936
3.2318
0.0082
1.3644
2.7949
0.5189
1.6745
0.3533
0.6696

$Ix =$

12
26
31
50

60
61
67
80
96

$w =$

1.9443
0.2925
2.6187
0.0480
1.3701
0.0014
3.0421
1.0911
1.6089

$Ix =$

12
26
50
60
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80
96

$w =$

3.4023
0.9821
0.4478
2.6265
0.2374
2.2342
2.9536

$Ix =$

26
50
61
63

$w =$

2.0769
1.2529

0.8788
0.0237

*I*x =

26
50
61
63

w =

3.5770
2.4633
1.9254
0.3649

*I*x =

61
63

w =

3.3773
1.1113

*I*x =

63

w =

2.2630

*I*x =

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w =

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Ix =

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Ix =

28

w =

0.0591

Ix =

28

w =

0.4806

Ix =

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62

$w =$

1.3073
0.0014

$Ix =$

28
62

$w =$

2.5394
0.2383

$Ix =$

62

$w =$

0.8804

$Ix =$

27
62

$w =$

0.1910
1.9278

$Ix =$

27
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$w =$

0.7870
3.3805

$Ix =$

27

$w =$

1.7884

$Ix =$

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$w =$

3.1950

$Ix =$

0×1 empty double column vector

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$Ix =$

59

$w =$

0.0461

$Ix =$

1
58
59

$w =$

0.1686
0.3679
0.9689

$Ix =$

1
21
23
58
59
64

$w =$

1.3929
0.2446
0.4026
1.8936
3.0761
0.2587

$Ix =$

21
23
64

$w =$

1.5980
1.9713
1.6336

$Ix =$

0×1 empty double column vector

$w =$

0×1 empty double column vector

$Ix =$

24

$w =$

0.3346

$Ix =$

22

24

60

62

63

82

$w =$

0.0403

1.8171

0.2309

0.0523

0.3030

0.0037

$Ix =$

22

28

60

62

63

82

$w =$

0.9413

0.0589

1.5626
0.9964
1.7424
0.6894

$Ix =$

2
22
28
62
82

$w =$

0.3849
3.0267
1.0244
3.1248
2.5594

$Ix =$

2
18
19
20
28
65

$w =$

1.9318
0.0000
0.0000
0.0658
3.1744
0.2308

$Ix =$

18
19
20
29
61
65
84

$w =$

0.5994
0.5994
1.0529
0.5569
0.0298
1.5624
0.0891

$Ix =$

18
19
20
29
30
61
84

$w =$

2.3832
2.3832
3.2243
2.2976
0.0613
0.8876
1.1407

$Ix =$

30
31
34
61
84
99

$w =$

1.0345
0.1684
0.0809
2.9298
3.3767
0.0809

$Ix =$

10
12
17
25
30
31
34
66
98
99

$w =$

0.0658
0.1801
0.0522
0.4959
3.1920
1.3922
1.1109
0.3344
0.0402
1.1109

$Ix =$

9
10
12
17
25
27
32
33
34
57
66
80
83
98
99

$w =$

0.1357
1.0527
1.4254
0.9960
2.1719

0.0297
0.0297
0.0297
3.3253
0.4202
1.8166
0.5567
0.4572
0.9409
3.3253

$Ix =$

9
10
17
26
27
32
33
57
80
81
83
85
98

$w =$

1.2948
3.2239
3.1242
0.2174
0.8874
0.8874
0.8874
2.0100
2.2973
0.0837
2.0901
0.0588
3.0261

$Ix =$

9
26
27
32
33
79

81
85
94
100

$w =$

3.6383
1.5273
2.9294
2.9294
2.9294
0.0522
1.1211
1.0240
0.2583
0.0809

$Ix =$

14
15
79
81
85
86
93
94
96
100

$w =$

0.4201
0.0720
0.9959
3.3429
3.1737
0.3343
0.4571
1.6327
0.0003
1.1107

$Ix =$

3
4
14
15

79
86
93
95
96
100

$w =$

0.5566
0.2875
2.0098
1.0773
3.1240
1.8163
2.0899
0.3846
0.6210
3.3250

$Ix =$

3
4
15
16
95
96

$w =$

2.2970
1.7049
3.2670
0.4200
1.9312
2.4260

$Ix =$

11
16
68

$w =$

0.2582
2.0097
0.5358

$Ix =$

8
11
35
53
68
76
77
87

$w =$

0.0657
1.6325
0.4570
0.5845
2.2547
0.1799
0.0579
0.0010

$Ix =$

8
35
53
76
77
87

$w =$

1.0523
2.0896
2.3534
1.4249
1.0204
0.6431

$Ix =$

8
52
67
77
87

$w =$

3.2232
0.0128
0.1919
3.1672
2.4695

$Ix =$

36
52
67
78
97

$w =$

0.0000
0.7790
1.4584
0.0036
0.0000

$Ix =$

36
38
52
75
78
92
97

$w =$

0.5989
0.0889
2.7296
0.4569
0.6886
0.0889
0.5989

$Ix =$

36
38

40
41
75
78
92
97

$w =$

2.3821
1.1399
0.3504
0.0586
2.0894
2.5580
1.1399
2.3821

$Ix =$

7
13
38
39
40
41
92

$w =$

0.0459
0.2872
3.3754
0.4381
1.8536
1.0235
3.3754

$Ix =$

5
6
7
13
37
39
41
54
56
74

88

$w =$

0.3671
0.0104
0.9676
1.7043
0.2304
2.0490
3.1728
0.4954
0.2580
0.1253
0.0000

$Ix =$

5
6
7
37
42
47
51
54
56
74
88

$w =$

1.8918
0.7599
3.0738
1.5613
0.5562
0.1568
0.0296
2.1708
1.6320
1.2624
0.5987

$Ix =$

6
42
43
44

47
51
74
88

$w =$

2.6937
2.2962
0.0135
0.0586
1.3584
0.8867
3.5839
2.3818

$Ix =$

43
44
47
48
51

$w =$

0.7844
1.0233
3.7445
0.0135
2.9282

$Ix =$

43
44
48
89
90
91

$w =$

2.7397
3.1724
0.7843
0.3339
0.0104
0.0000

$Ix =$

45
48
89
90
91

$w =$

0.0296
2.7396
1.8153
0.7597
0.5986

$Ix =$

45
55
90
91

$w =$

0.8865
0.3178
2.6934
2.3815

$Ix =$

45
46
55
73

$w =$

2.9278
0.2578
1.7777
0.0033

$Ix =$

46
50
73

$w =$

1.6315
0.0055
0.6833

$Ix =$

50
71
73

$w =$

0.7116
0.0972
2.5477

$Ix =$

49
50
70
71
72

$w =$

0.1353
2.6020
0.1155
1.1694
0.0972

$Ix =$

49
69
70
71
72

$w =$

1.2935
0.5352
1.2306
3.4259
1.1693

$Ix =$

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72

$w =$

3.6361
2.2533
3.5302
3.4258

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22

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0.2050

$Ix =$

22

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1.1648

$Ix =$

22

$w =$

2.9094

$Ix =$

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$Ix =$

21

$w =$

0.0175

$Ix =$

21

$w =$

0.5755

$Ix =$

21

$w =$

1.9183

Ix =

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Ix =

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Ix =

18

w =

0.2272

Ix =

2
3
18
19
23
57

$w =$

0.0067
0.2803
1.2169
0.3427
0.2111
0.0067

$Ix =$

2
3
18
19
23
56
57
58

$w =$

0.5014
1.3360
2.9913
1.4686
1.1792
0.0540
0.5014
0.0540

$Ix =$

2
3
19
23
56
57
58

$w =$

1.7810
3.1766
3.3793
2.9321
0.7376
1.7810
0.7376

$Ix =$

24
56
58

$w =$

0.0034
2.2060
2.2060

$Ix =$

1
8
24
55

$w =$

0.3120
0.0777
0.4685
0.1637

$Ix =$

1
8
20
24
25
30
31
32
54
55
59
61

$w =$

1.4042
0.8193
0.0545
1.7186

0.0063
0.1292
0.0684
0.1844
0.0001
1.0632
0.0482
0.1292

$Ix =$

1
4
8
9
20
25
30
31
32
54
55
59
61

$w =$

3.2813
0.2325
2.3458
0.2603
0.7396
0.4985
0.9720
0.7885
1.1149
0.4046
2.7474
0.7157
0.9720

$Ix =$

4
9
20
25
30
31
32
53

54
59
61
62

$w =$

1.2290
1.2919
2.2094
1.7755
2.5996
2.2934
2.8301
0.3789
1.5940
2.1680
2.5996
0.0968

$Ix =$

4
9
10
29
53
54
62
63

$w =$

3.0104
3.1083
0.2538
0.1673
1.5425
3.5682
0.8789
0.0566

$Ix =$

10
16
17
29
51
53

60
62
63
64

$w =$

1.2773
0.0118
0.3751
1.0723
0.3416
3.4910
0.0001
2.4459
0.7471
0.1300

$Ix =$

10
16
17
29
49
51
52
60
63
64
65
85

$w =$

3.0857
0.5405
1.5349
2.7620
0.0673
1.4663
0.1709
0.4061
2.2224
0.9743
0.0013
0.0060

$Ix =$

16
17
26
49
51
52
60
64
65
85

$w =$

1.8540
3.4795
0.0010
0.7848
3.3759
1.0812
1.5969
2.6033
0.4383
0.4956

$Ix =$

7
11
26
38
44
49
52
60
65
85

$w =$

0.2532
0.0128
0.4340
0.0445
0.0445
2.2872
2.7764
3.5726
1.6601
1.7701

$Ix =$

7
11
26
38
44
45
50
65
66

$w =$

1.2761
0.5469
1.6519
0.7014
0.7014
0.3765
0.3765
3.6668
0.0857

$Ix =$

7
11
15
26
37
38
44
45
50
66

$w =$

3.0839
1.8659
0.0833
3.6545
0.0265
2.1431
2.1431
1.5378
1.5378
0.8450

$Ix =$

15
36
37
45
46
50
66

$w =$

0.8373
0.0080
0.6227
3.4838
0.3195
3.4838
2.3890

$Ix =$

5
12
14
15
36
37
43
46

$w =$

0.3069
0.0577
0.2154
2.3761
0.5126
2.0037
0.1341
1.4201

$Ix =$

5
12
14
33
36
43

46
47
86

$w =$

1.3933
0.7511
1.1892
0.0193
1.8019
0.9852
3.3055
0.1528
0.0279

$Ix =$

5
6
12
13
14
33
43
47
48
86
100

$w =$

3.2646
0.0840
2.2293
0.0268
2.9479
0.5860
2.6212
1.0350
0.0043
0.6296
0.0043

$Ix =$

6
13
33
34

42
47
48
84
86
92
98
100

$w =$

0.8394
0.6245
1.9374
0.1940
0.0082
2.7020
0.4793
0.1940
2.0161
0.0356
0.3051
0.4793

$Ix =$

6
13
34
39
42
48
82
84
92
98
100

$w =$

2.3797
2.0070
1.1382
0.3495
0.5142
1.7391
0.1349
1.1382
0.6643
1.3896
1.7391

$Ix =$

34
35
39
40
41
42
82
84
87
91
92
98

$w =$

2.8673
0.0708
1.4825
0.0018
0.0283
1.8050
0.9875
2.8673
0.0865
0.1764
2.0778
3.2589

$Ix =$

35
39
40
41
82
83
87
88
91
99

$w =$

0.7967
3.4004
0.4471
0.6314

2.6249
0.0045
0.8474
0.1017
1.0951
0.2946

$Ix =$

35
40
41
83
87
88
89
90
91
99

$w =$

2.3073
1.6773
2.0194
0.4809
2.3931
0.8936
0.3221
0.0084
2.7986
1.3670

$Ix =$

27
40
81
83
88
89
90
93
99

$w =$

0.0204
3.6924
0.0037

1.7421
2.4704
1.4255
0.5159
0.3848
3.2243

$Ix =$

27
28
74
81
89
90
93

$w =$

0.5919
0.0200
0.1774
0.4720
3.3138
1.8081
1.5543

$Ix =$

27
28
74
81
93

$w =$

1.9482
0.5895
1.0975
1.7252
3.5087

$Ix =$

28
74
75
96

97

$w =$

1.9438
2.8025
0.2629
0.1189
0.0479

$Ix =$

71
75
79
94
95
96
97

$w =$

0.1366
1.2976
0.0081
0.0594
0.0465
0.9433
0.7145

$Ix =$

67
71
73
75
77
79
80
94
95
96
97

$w =$

0.2707
0.9920
0.3822

3.1173
0.1145
0.5129
0.1784
0.7570
0.7091
2.5526
2.1660

$Ix =$

67
70
71
73
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79
80
94
95

$w =$

1.3150
0.1999
2.6323
1.5492
0.9309
1.8026
1.0999
2.2396
2.1566

$Ix =$

67
70
73
77
80

$w =$

3.1441
1.1525
3.5010
2.5321
2.8063

$Ix =$

70
72

$w =$

2.8899
0.0744

$Ix =$

68
72
78

$w =$

0.0295
0.8086
0.3334

$Ix =$

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69
72
78

$w =$

0.6369
0.0503
2.3276
1.4492

$Ix =$

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69
76
78

$w =$

2.0292
0.7239

0.3588
3.3499

Ix =

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2.1823
1.5016

Ix =

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3.4293

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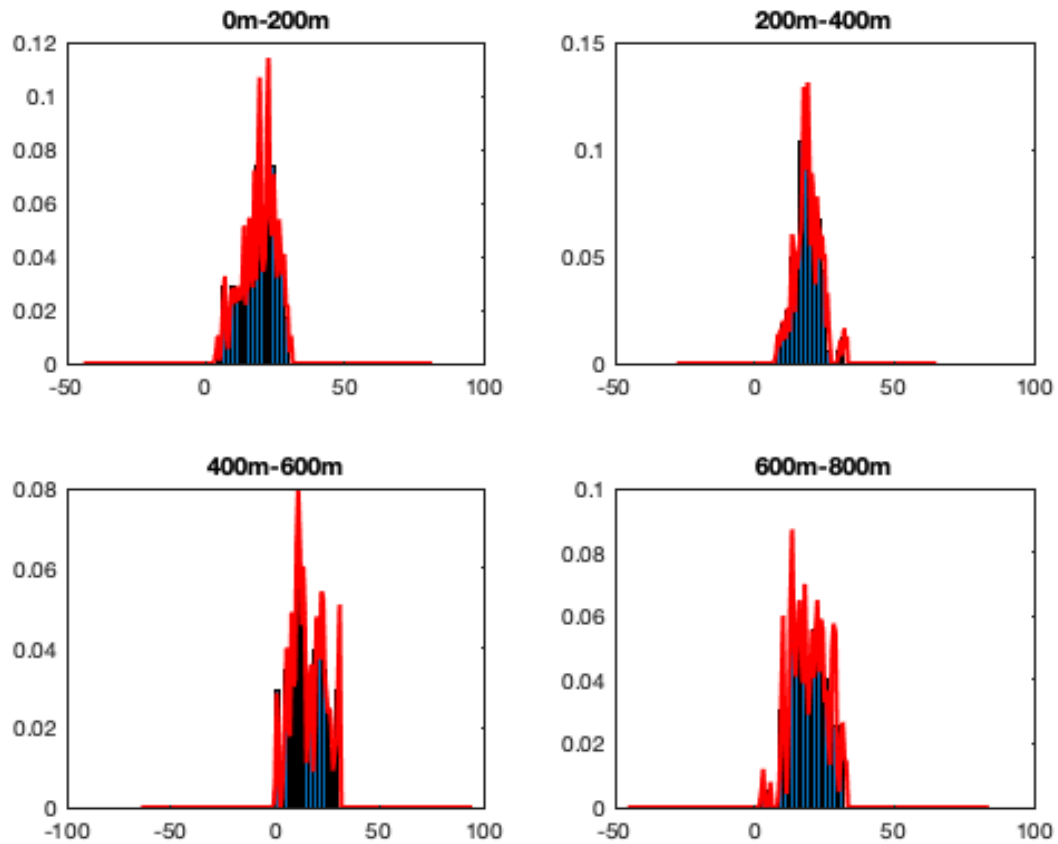
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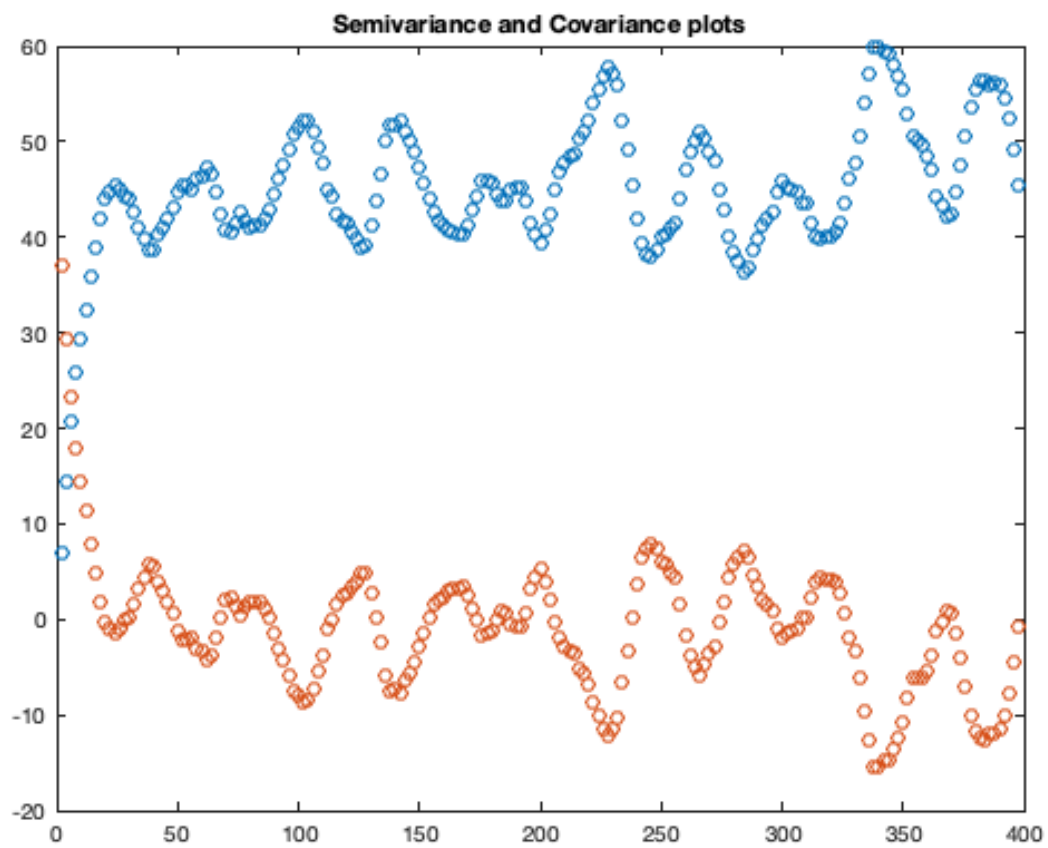
Problem 2

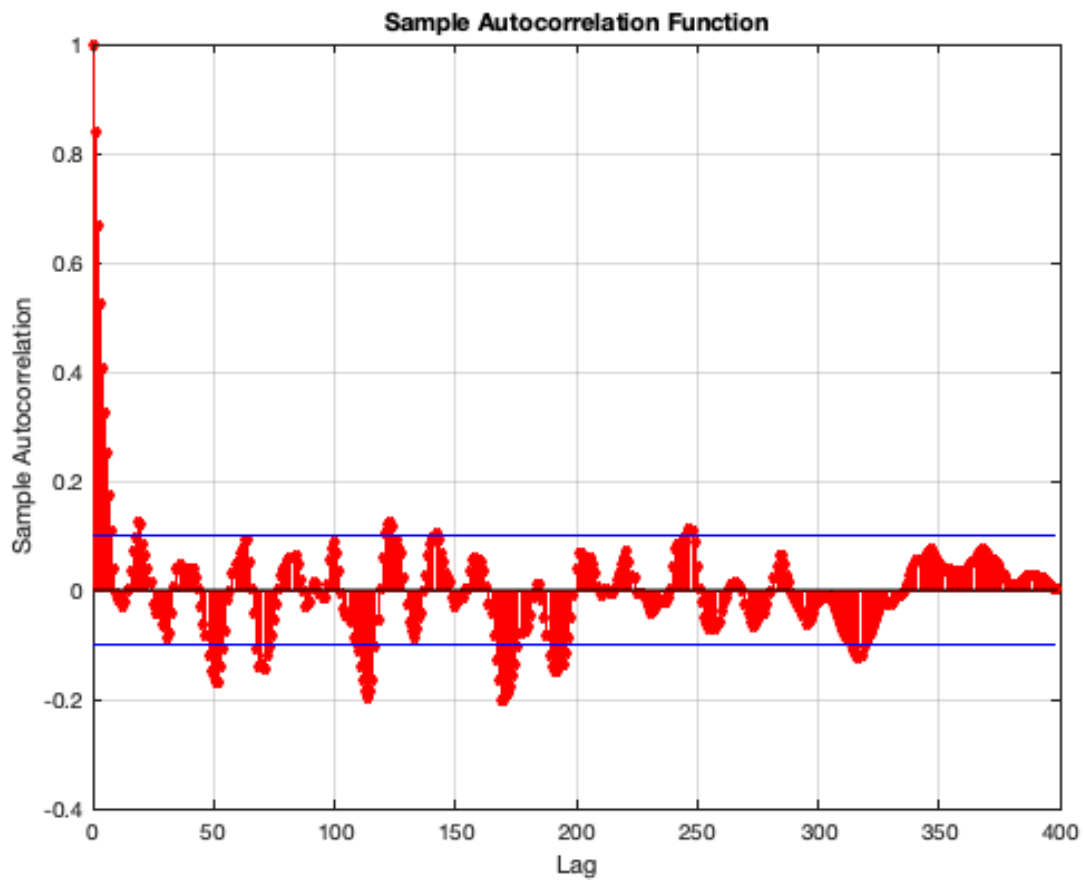
the answers to the questions are that the mean for the accumulation rates is fairly constant but the variance is not constant

Problem 3 ? calculate semivariance

```
clear dist ;
dist = D(:,1);
bdot = D(:,2);
[h,V,c] = semivariogram(dist, bdot);
figure(2); clf;
plot(h,V,'o');hold on
title('Semivariance and Covariance plots')%plots semivariance
plot(h,c, 'o'); %plots covariance
% plot autocorrelation
```

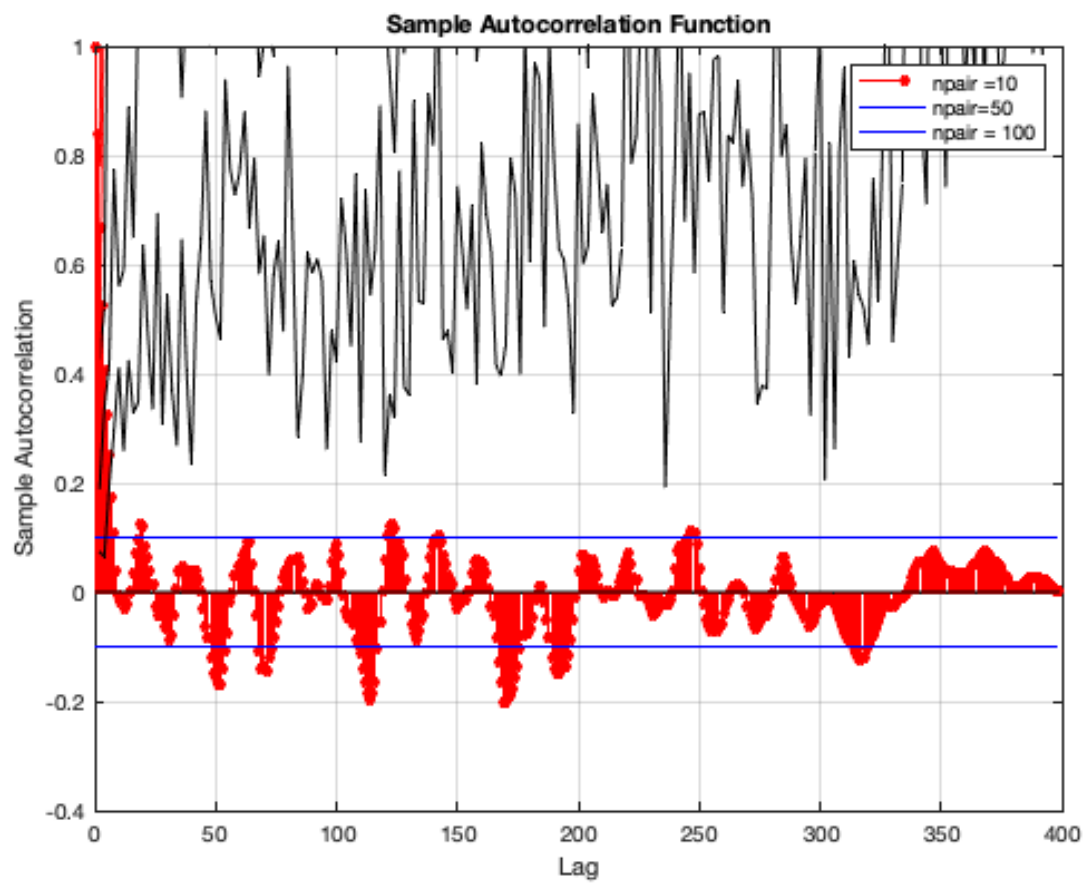
```
figure(3); clf  
autocorr(bdot, 'NumLags', 399);
```

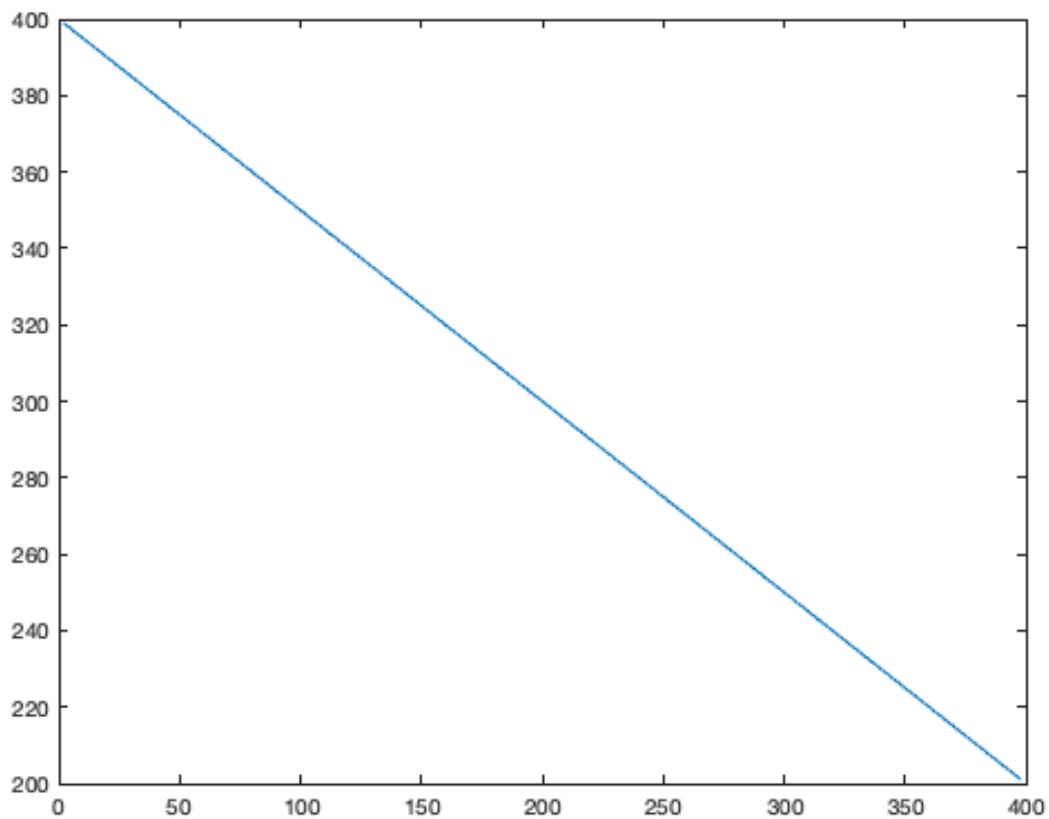




problem 4

```
[h,V,npairs] = semivariogram_mc(dist, bdot, 10);  
clear figure(3);  
figure(3); hold on  
plot(h, V, 'k'); hold on  
[h,V,npairs] = semivariogram_mc(dist, bdot, 50);  
plot(h, V, 'r'); hold on  
[h,V,npairs] = semivariogram_mc(dist, bdot, 100);  
plot(h, V, 'b'); hold on  
legend('npair =10', 'npair=50', 'npair = 100')  
  
figure(4); hold on; clf  
plot(h, npairs); hold on
```





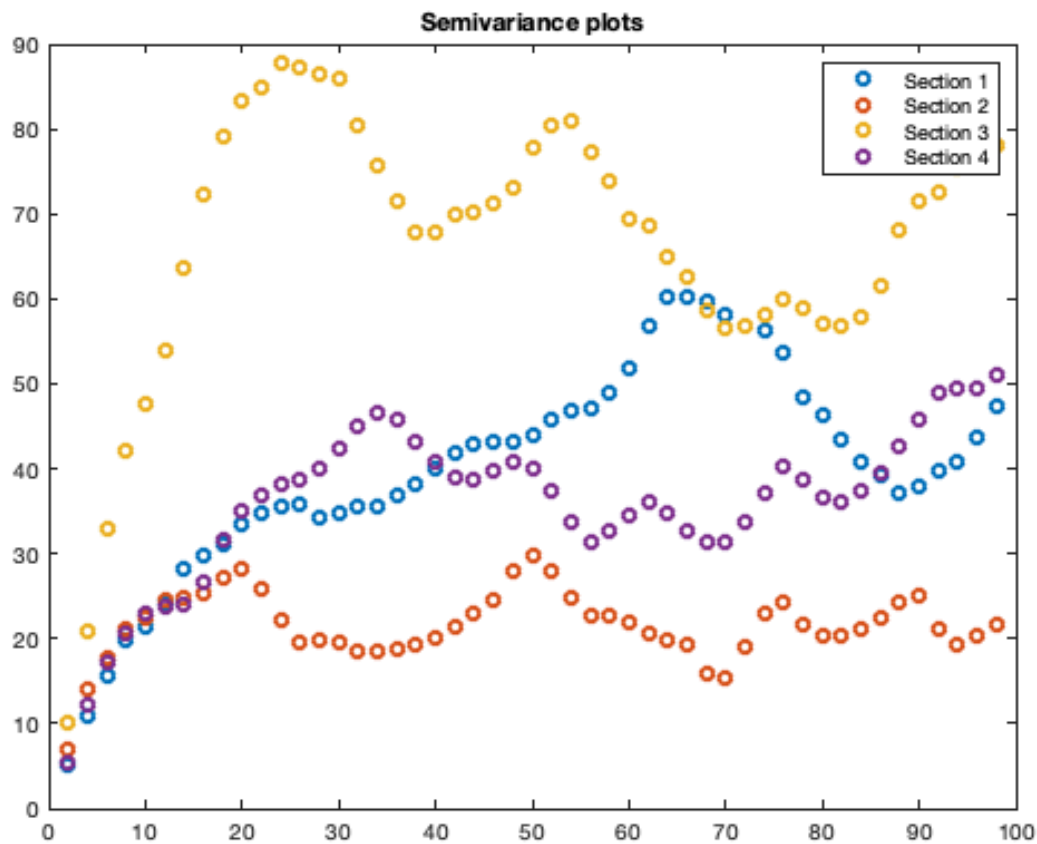
Problem 5 Plot semivariance for 4 seperate sections

```
[h,V,c] = semivariogram(D1(:,1), D1(:,2));
figure(5); clf;
plot(h,V,'o', 'LineWidth', 2);hold on
title('Semivariance plots')%plots semivariance

[h,V,c] = semivariogram(D2(:,1), D2(:,2));
plot(h,V,'o', 'LineWidth', 2);hold on
title('Semivariance plots')%plots semivariance

[h,V,c] = semivariogram(D3(:,1), D3(:,2));
plot(h,V,'o', 'LineWidth', 2);hold on
title('Semivariance plots')%plots semivariance

[h,V,c] = semivariogram(D4(:,1), D4(:,2));plot(h,V,'o','LineWidth', 2);hold on
title('Semivariance plots')%plots semivariance
legend('Section 1', 'Section 2', 'Section 3', 'Section 4')
```

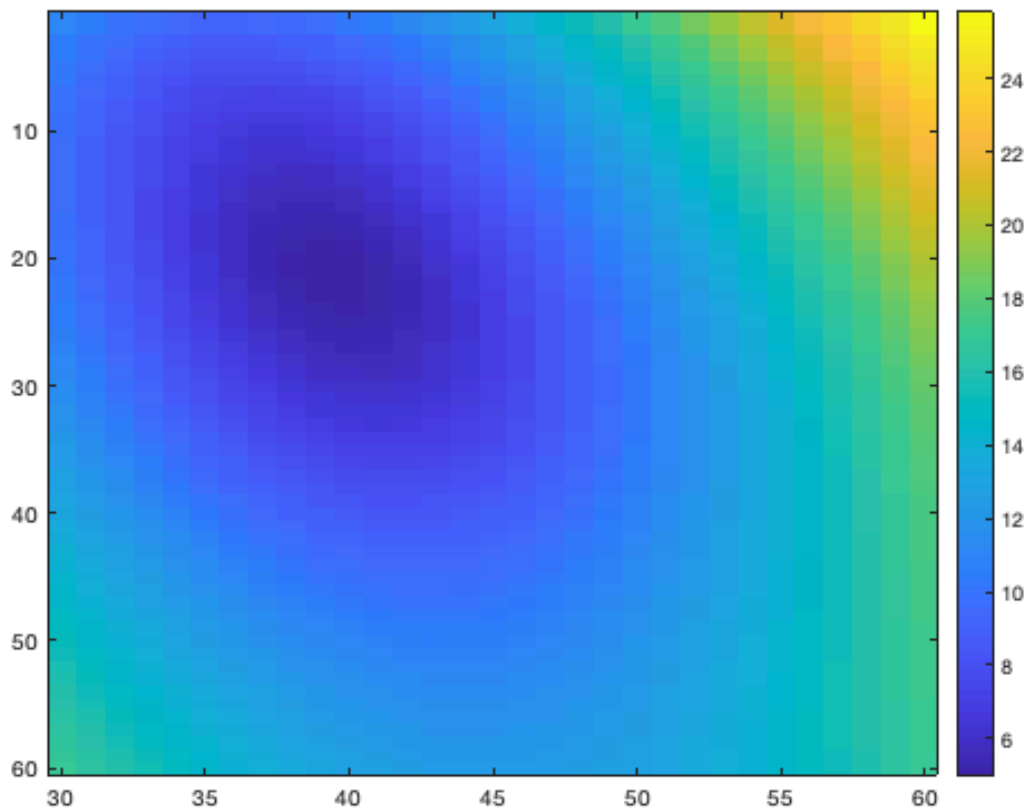


Answer to Question

Yes, semivariance relies on the lag. The sill is the range of the measured semivariance value which depends on the square of the standard deviations and the standard deviation is the range of error you can expect for a given value. The standard deviation is used to determine the semivariance therefore making the semivariance dependent on that range of error or lag.

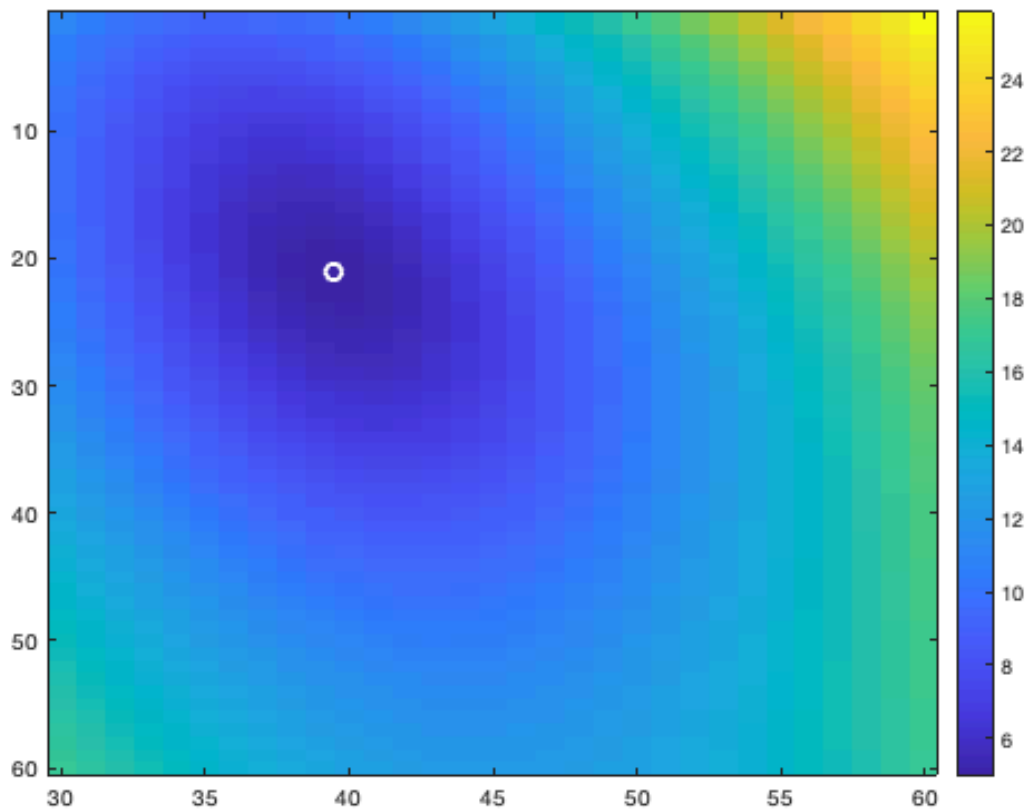
Problem 6 finding best variogram parameters

```
a = 1:60 ; %range of a values
c = 30:60 ; %range of sill values
for p = 1:length(a) %loop through values of bdot
    for q = 1:length(c) %loop through values of A
        rmse(p,q) = model_variogram(h,V,c(q),a(p),'L');
    end
end
figure(3); clf
imagesc(c,a,rmse);
colorbar
% V = model_variogram(h,c,a,n,type)
```

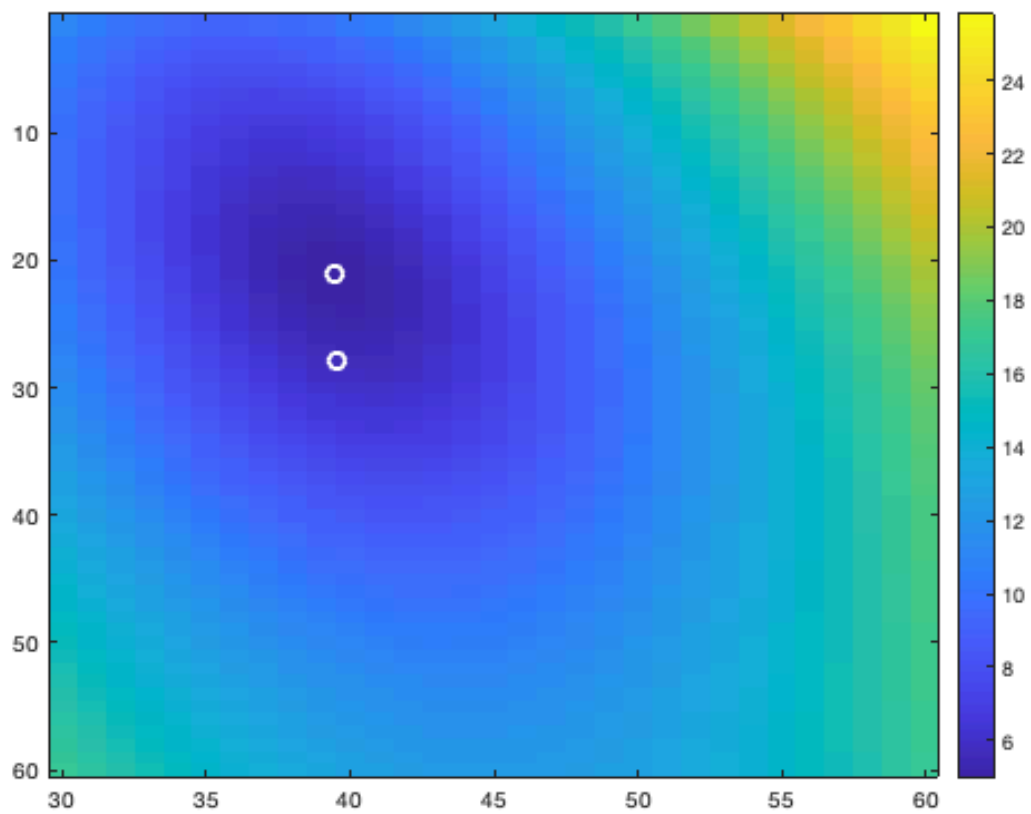
Problem 7 repeat above using fminsearch

```
fh = @(p) model_variogram(h,V,p(1), p(2), 'L');  
[pbest, fval] = fminsearch(fh,[30,60]);  
figure(3); hold on  
plot(pbest(1), pbest(2), 'wo', 'markersize', 8, 'linewidth', 2)
```



Probelm 8

```
fh = @(p) model_variogram(h,V,p(1), p(2), 'S');  
[pbest, fval] = fminsearch(fh,[30,60]);  
figure(3); hold on  
plot(pbest(1), pbest(2), 'wo', 'markersize', 8, 'linewidth', 2)
```



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