RANDOM SIGNAL AND SYSTEM (EE555)

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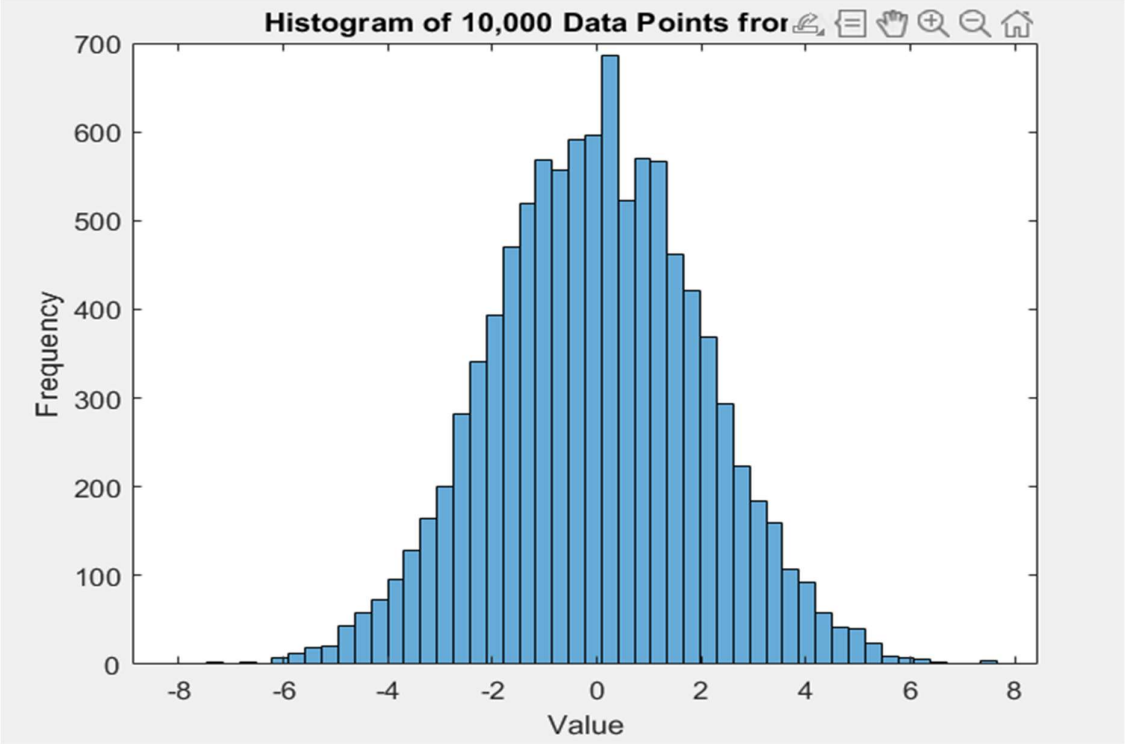
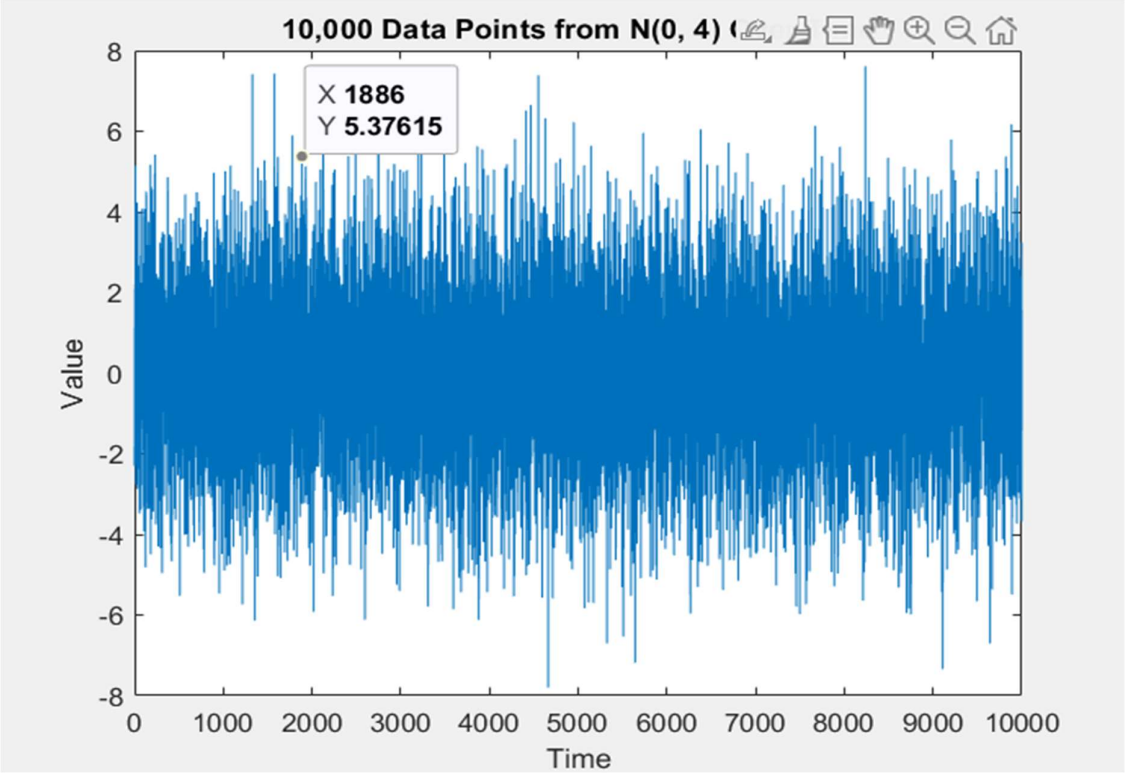
ASSIGNMENT 2

Q1. Generate 10000 sample over time from N(0,4).

```
% Number of data points

numDataPoints = 10000;
% Generate data points from N(0, 1)
standardNormalDataPoints = randn(numDataPoints, 1);
% Adjust the data points to N(0, 4) by multiplying with the standard deviation
dataPoints = 2 * standardNormalDataPoints;     % std dev sqrt(4)

% Generate time vector assuming each data point is taken at consecutive time
units
timeVector = 1:numDataPoints;
% Plot the data points over time
figure;
plot(timeVector, dataPoints);
xlabel('Time');
ylabel('Value');
title('10,000 Data Points from N(0, 4) Over Time');
% Optionally, you can plot the histogram of the data points to visualize the
distribution
figure;
histogram(dataPoints, 50); % Adjust the number of bins as needed
xlabel('Value');
ylabel('Frequency');
title('Histogram of 10,000 Data Points from N(0, 4)');
```

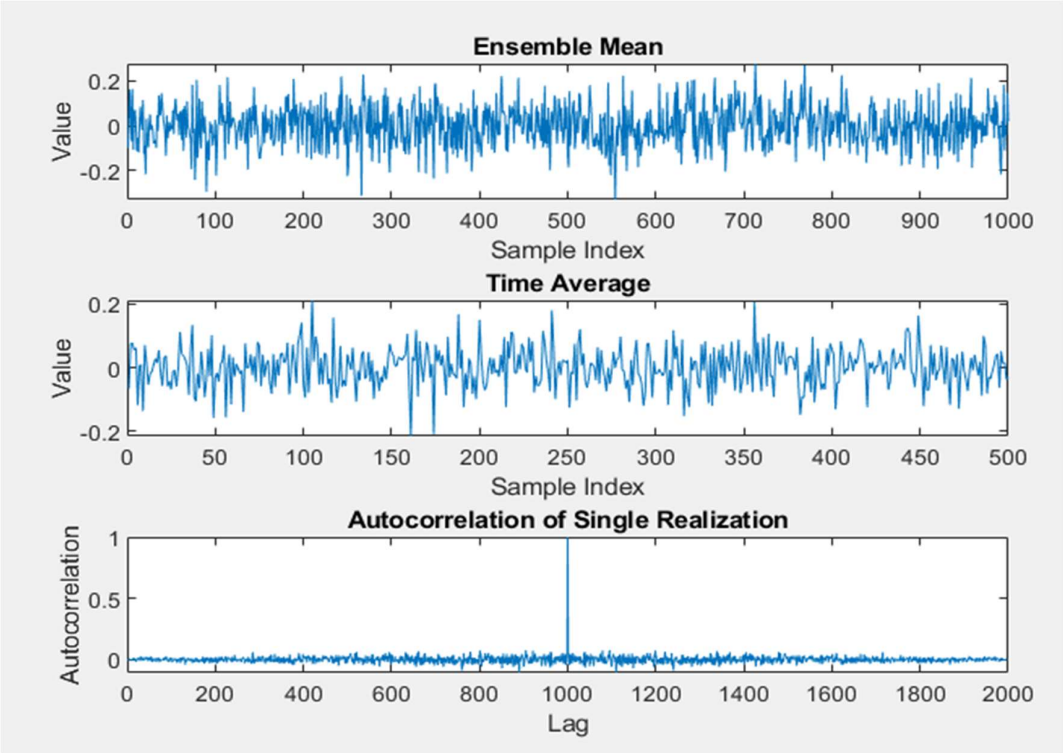

Histogram of 10,000 Data Points fror
Frequency
Value
700
600
500
400
300
200
100
0
-8
-6
-4
-2
0
2
4
6
8

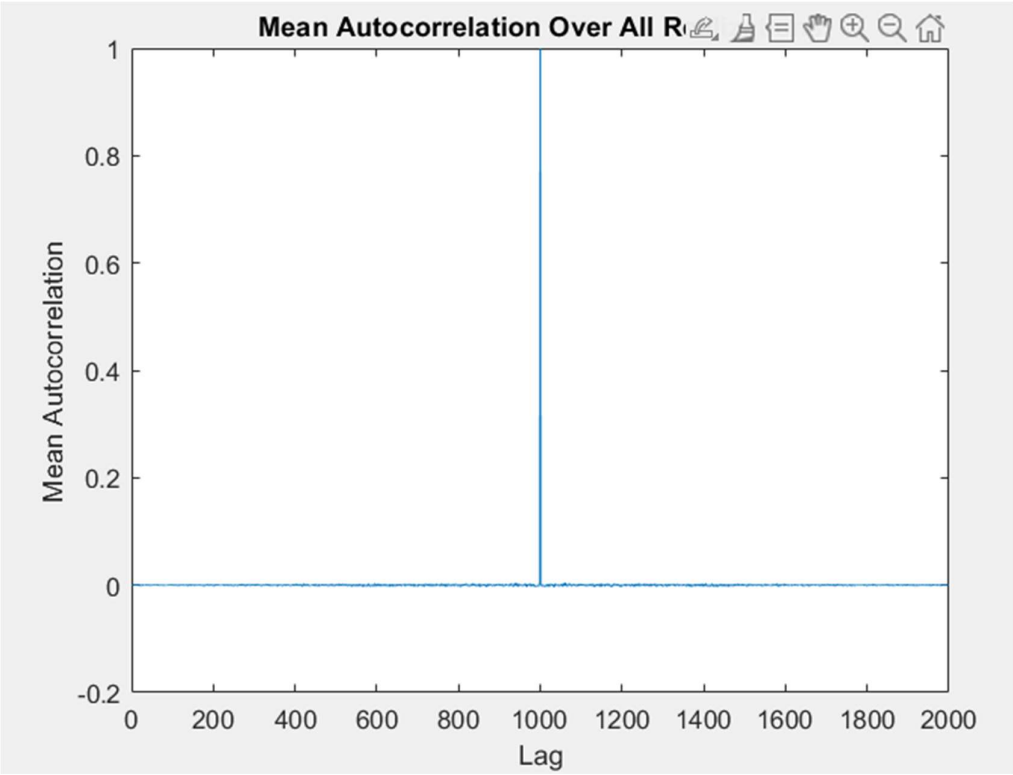

10,000 Data Points from N(0, 4) (
X 1886
Y 5.37615
Value
Time
8
6
4
2
0
-2
-4
-6
-8
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000

Q2. Generate such 500 ensemble calculate ensemble mean and time average and also calculate autocorrelation over time single realization and the process is WSS?

```
% Define parameters
numRealizations = 500; % Number of realizations (ensemble)
numSamples = 1000; % Number of samples in each realization
meanValue = 0; % Mean of the process
varianceValue = 4; % Variance of the process

% Generate 500 realizations of a WSS process
realizations = sqrt(varianceValue) * randn(numSamples, numRealizations) +
meanValue;

% Calculate ensemble mean
ensembleMean = mean(realizations, 1);

% Calculate time average
timeAverage = mean(realizations, 2);

% Calculate autocorrelation over time for a single realization
singleRealization = realizations(1,:);
autocorrSingleRealization = xcorr(singleRealization, 'coeff');

% Plot results
figure;
subplot(3, 1, 1);
plot(ensembleMean);
title('Ensemble Mean');
xlabel('Sample Index');
ylabel('Value');

subplot(3, 1, 2);
plot(timeAverage);
title('Time Average');
xlabel('Sample Index');
ylabel('Value');

subplot(3, 1, 3);
plot(autocorrSingleRealization);
title('Autocorrelation of Single Realization');
xlabel('Lag');
ylabel('Autocorrelation');
```

```
% Check if the process is WSS by comparing autocorrelation at different lags
% If the autocorrelation is approximately the same at different lags, the process
is WSS
figure;
autocorrAll = zeros(numSamples*2-1, numRealizations);
for i = 1:numRealizations
    autocorrAll(:,i) = xcorr(realizations(:,i), 'coeff');
end
meanAutocorr = mean(autocorrAll, 2);
plot(meanAutocorr);
title('Mean Autocorrelation Over All Realizations');
xlabel('Lag');
ylabel('Mean Autocorrelation');

% Indicate whether the process is WSS based on autocorrelation
if max(abs(meanAutocorr(2:end))) <= 0.05
    disp('The process is WSS.');
else
    disp('The process is not WSS.');
end
```





MATLAB Command Window
>> clear all
>> rss_ass

The process is not WSS.

>> ensembleMean

ensembleMean =

Columns 1 through 15

0.0496 0.0069 0.0923 -0.0089 -0.0104 -0.0061 -0.0168 -0.0507 -0.0644 0.0348 -0.0207 0.0647 -0.0388 -0.0780 0.0416

Columns 16 through 30

-0.0085 -0.0842 0.0941 -0.0420 -0.0120 0.1320 -0.0137 0.0985
0.0127 -0.0128 0.0322 -0.0715 -0.0172 0.0291 0.1056

Columns 31 through 45

0.1254 -0.0645 0.1085 0.0322 0.0872 0.0085 -0.0165 -0.0087 -
0.0881 -0.0508 0.0592 -0.0232 -0.0107 -0.0656 -0.0336

Columns 46 through 60

-0.0117 0.0508 -0.0162 -0.1018 -0.0115 -0.0346 0.0242 -0.0551 -
0.0323 0.0445 -0.0349 0.0998 -0.0617 -0.0658 -0.0306

Columns 61 through 75

-0.0432 -0.0755 -0.0065 -0.0048 -0.0398 0.1184 -0.0243 0.0745 -
0.0625 -0.0450 0.1219 -0.0010 0.0034 0.0404 0.0873

Columns 76 through 90

0.0005 -0.0852 0.0781 0.1373 -0.0726 0.1260 0.0344 -0.0636
0.0266 0.0707 -0.0274 0.0771 0.0114 0.0861 0.0569

Columns 91 through 105

-0.1179 -0.0092 0.1067 -0.0320 0.0621 -0.0348 0.0671 -0.0092
0.0301 0.0132 -0.0750 0.0009 -0.0610 -0.0299 0.1084

Columns 106 through 120

0.1592 -0.0623 0.0931 -0.0063 0.0145 -0.0220 -0.0464 -0.0365
0.0089 -0.0719 0.0080 0.0229 -0.0008 0.1122 -0.0729

Columns 121 through 135

0.0721 0.0827 0.0333 0.0447 0.0276 0.0911 -0.0527 0.0046 -0.0082
0.0542 -0.0902 0.0557 0.0052 0.0679 0.0367

Columns 136 through 150

-0.0985 0.0406 0.1378 0.0462 -0.0280 0.0496 -0.0337 -0.0683
0.0017 0.1068 -0.0201 0.0814 -0.0388 0.0264 -0.0342

Columns 151 through 165

-0.0053 0.0923 -0.0615 -0.0680 0.0244 0.0088 -0.0157 -0.1254 0.0986 -0.0721 -0.0265 0.0531 0.0385 0.0052 0.0086

Columns 166 through 180

-0.1025 0.0047 0.0132 -0.0622 -0.1699 0.1062 -0.0775 0.1027 -0.0429 -0.0378 0.1777 0.0056 -0.0131 -0.1409 -0.0347

Columns 181 through 195

0.0986 0.0197 0.0769 0.0698 0.0088 -0.0253 -0.0574 -0.1323 0.0020 -0.0937 0.0461 0.0429 -0.0097 0.0583 0.0454

Columns 196 through 210

-0.0398 -0.0426 0.0265 0.0378 -0.0249 0.0502 0.0563 0.0553 0.1751 -0.0616 0.0308 0.0367 0.0690 0.0028 -0.0070

Columns 211 through 225

0.0239 0.0802 0.0256 0.0913 0.0011 -0.0940 -0.0217 0.0305 0.0805 -0.1183 -0.0377 0.0002 0.0529 -0.0233 -0.0583

Columns 226 through 240

0.0937 0.0124 -0.0300 0.0628 0.0522 -0.0320 0.0840 0.0490 -0.0125 0.0787 -0.1891 -0.0348 0.0967 -0.1082 0.0419

Columns 241 through 255

-0.0305 0.0331 0.0893 -0.0223 -0.1139 0.0548 -0.0680 0.0193 -0.0200 0.0480 -0.0737 0.1567 0.0208 0.0435 -0.0100

Columns 256 through 270

0.1078 0.0051 0.0161 0.0395 0.1273 -0.0776 -0.0267 0.0399 0.1272 -0.0703 -0.0196 -0.0100 -0.0624 0.0176 -0.1171

Columns 271 through 285

0.0276 0.0093 0.0494 -0.0417 0.1039 -0.0523 -0.0569 -0.0860 0.0340 -0.0019 -0.0444 0.0262 -0.0148 0.0391 -0.0131

Columns 286 through 300

0.0399 0.0463 -0.0151 0.0309 -0.0437 0.0082 -0.0177 -0.0599 0.0941 0.0472 -0.0337 0.0018 -0.0415 -0.0416 0.0170

Columns 301 through 315

0.0226 -0.0341 -0.0183 -0.0621 -0.0304 0.0597 -0.1132 0.0359 -0.0338 0.0585 0.0414 0.0856 0.0688 -0.0596 -0.0014

Columns 316 through 330

0.0019 -0.0204 -0.0127 0.0321 -0.0872 0.0339 0.0700 0.0433 0.0351 0.0860 -0.0939 -0.0448 0.1848 -0.0435 0.0032

Columns 331 through 345

0.0088 -0.0403 -0.0867 -0.0539 0.0485 0.0099 0.0812 -0.0186 0.0591 -0.0561 -0.0523 -0.0320 0.0273 0.0251 -0.0111

Columns 346 through 360

-0.0737 0.0131 -0.0133 -0.0107 0.0514 -0.1359 0.0169 -0.0618 0.0654 -0.0009 -0.0418 -0.0048 0.0373 -0.1041 -0.0183

Columns 361 through 375

-0.0090 0.0078 -0.0498 -0.0987 -0.0235 -0.0815 0.0399 0.0240 0.0378 -0.0240 -0.0299 0.0167 0.1547 -0.0041 -0.0186

Columns 376 through 390

-0.0302 0.1229 0.0453 0.0016 0.0469 0.1107 -0.0761 -0.1140 0.0695 0.0668 -0.0407 0.0418 0.0892 0.0478 0.0928

Columns 391 through 405

-0.0013 0.0863 -0.0447 -0.0245 -0.0705 -0.0575 -0.0609 0.0363 0.0974 -0.0233 0.0741 -0.0086 0.0893 -0.0966 0.0851

Columns 406 through 420

0.0384 -0.0557 0.0375 -0.1166 -0.0784 0.0000 -0.0529 0.0587 -0.0156 0.0261 -0.0942 0.0000 0.0539 -0.0176 -0.0728

Columns 421 through 435

0.0461 0.0495 0.0059 -0.0320 0.0001 0.0101 -0.0096 0.1308 -0.0065 -0.0333 0.0108 -0.1278 0.0095 -0.0215 0.0948

Columns 436 through 450

0.0239 -0.0087 0.1322 0.0292 -0.0550 0.0022 -0.0740 -0.0218 0.0083 0.0425 -0.1042 -0.0311 -0.0260 0.0001 -0.0153

Columns 451 through 465

-0.0217 -0.1038 0.0315 0.0012 0.0646 -0.0177 -0.0736 -0.0014 -0.0148 -0.0034 -0.0809 0.0662 0.0610 -0.0244 -0.0306

Columns 466 through 480

-0.0419 -0.1328 -0.0090 0.0579 -0.0625 0.0103 -0.0087 -0.0197 0.1146 -0.0040 -0.0782 -0.0724 0.0446 0.0181 0.0512

Columns 481 through 495

-0.0439 -0.0422 -0.0501 0.0351 -0.0433 0.0041 0.0031 0.0159 -0.0691 0.0249 0.0734 -0.0969 0.1573 -0.0453 -0.0147

Columns 496 through 500

0.0742 -0.0172 0.0355 -0.0661 -0.0510

>> timeAverage

timeAverage =

0.0493

0.0820
-0.1311
0.0515
0.0512
0.1756
-0.1194
0.1204
-0.0160
0.0433
-0.0415
-0.0185
-0.1286
-0.0158
-0.1538
0.1132
-0.0111
-0.0503
0.0565
-0.1032
0.0729
0.0048
-0.0606
0.0390
-0.0883
0.2707
-0.1314
0.0546
0.0957
0.0947
-0.0672
0.0265
0.1390
0.0696
0.0771
0.0917
0.0019
0.0971
0.1892
0.0703
0.0597
0.0685
0.0818

0.1075
0.0358
0.1991
0.0870
-0.0508
0.0050
-0.0593
-0.0126
0.0455
0.1115
0.0807
-0.0743
-0.0850
0.0888
0.1620
0.0412
0.0087
0.1377
0.0644
0.0936
0.0111
0.0550
-0.0932
0.0578
-0.1375
0.0315
-0.0343
0.0411
-0.0031
0.0124
0.1087
0.0176
0.0938
0.0516
-0.0942
0.0126
-0.0533
-0.0132
-0.0187
0.0323
0.0541
0.0115

-0.0255
0.1444
-0.1061
-0.0468
0.0341
0.0898
0.0569
-0.1417
0.0652
0.0266
0.0047
0.0419
-0.0315
-0.0304
0.0046
0.0980
-0.0370
0.0717
-0.0856
0.1014
0.0463
-0.0060
-0.1209
-0.0839
0.1252
0.0073
0.0507
0.0898
-0.0565
-0.0813
-0.0427
0.0398
-0.1393
-0.0773
0.0605
0.0179
0.1304
0.0237
-0.0140
0.0339
0.0332
0.0393

-0.0458
0.0071
-0.0077
0.0400
-0.1395
0.0348
0.0543
-0.1179
-0.1874
-0.0179
0.0050
-0.0059
-0.0512
0.0185
0.0333
0.1415
-0.0129
0.0614
0.1441
0.0797
0.0121
0.0413
0.2698
-0.0246
0.1035
0.0515
0.0435
0.0013
-0.0157
0.0454
-0.0764
-0.1035
-0.0732
-0.0176
-0.0101
0.0518
0.0914
0.1414
-0.1543
-0.0557
-0.0649
-0.0316

-0.0618
-0.0173
-0.0473
0.0209
0.1040
0.0027
-0.0025
-0.0952
-0.0112
0.0105
-0.0296
0.0548
0.0593
-0.1936
0.0072
-0.0207
0.0637
0.0693
-0.0045
-0.1678
-0.0152
-0.0732
-0.0539
0.0259
-0.1423
0.0058
-0.1780
0.0453
-0.0401
0.1225
0.0672
-0.1137
0.0498
-0.2036
0.0977
0.1507
-0.0158
0.1568
0.1358
-0.0669
0.1037
-0.0705

0.1105
-0.1303
-0.0346
0.0273
0.1710
0.0944
-0.0252
-0.0222
0.1360
-0.0133
0.0741
0.0501
-0.0842
-0.0328
0.1096
0.1075
0.0910
-0.0669
0.0694
0.0342
-0.1108
0.0344
-0.0672
-0.0407
-0.0848
-0.1674
-0.0525
-0.0950
0.0778
0.0685
-0.2254
0.0017
-0.1139
-0.0889
-0.0381
-0.1062
0.0068
-0.0229
-0.1118
0.0354
-0.0163
-0.0046

-0.0090
0.0884
-0.0829
0.0898
0.0037
0.0489
0.0020
-0.1571
0.0259
-0.0263
-0.0960
-0.0318
-0.0391
0.0328
-0.0865
0.1664
-0.1540
0.0483
-0.0021
-0.0376
0.0346
0.0872
-0.0986
0.0273
0.0040
-0.0949
0.0082
-0.0810
-0.1509
-0.1096
0.0836
-0.1407
-0.0957
0.0134
0.0446
-0.0359
-0.0183
-0.1398
-0.0503
0.1358
0.0881
-0.1039

-0.0506
0.1723
-0.0101
-0.0517
0.0104
0.2303
0.1400
0.0695
0.0887
0.1070
-0.0029
0.1372
-0.0343
0.0959
0.0043
-0.0923
0.1320
0.0277
0.0843
0.2027
-0.0101
0.0292
0.1063
0.0502
-0.2141
-0.1558
-0.0622
0.0798
-0.0821
-0.0264
0.0146
0.0177
0.1591
0.0102
-0.2675
0.0159
0.0511
-0.0744
-0.1711
0.1881
0.0225
-0.0038

-0.0700
0.0256
-0.0749
-0.0650
0.1479
-0.1207
0.0077
0.0417
0.0495
-0.0551
-0.1081
0.0180
-0.1380
0.0750
-0.0271
0.1403
0.1845
0.1009
0.0253
0.0001
-0.0997
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0.0092
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0.1091
0.1125
-0.0280
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0.0236
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0.0818
0.0479
-0.0327
-0.0113
0.1074
0.0936
-0.0001
-0.1327
0.0220

0.0175
0.0786
0.0104
-0.0857
0.0387
-0.0600
-0.2028
0.0269
-0.0291
-0.0765
-0.0832
0.0905
-0.0410
0.1346
-0.0523
0.1503
0.0103
0.1135
-0.0230
0.0812
0.0350
-0.0944
-0.0997
-0.0948
-0.1592
0.1214
-0.0593
0.0224
-0.1057
-0.0589
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0.0027
-0.0454
0.0562
0.0245
-0.1228
-0.0891
0.1424
0.0872
-0.0208
0.1284
-0.0102

-0.0284
-0.0369
-0.0951
0.1701
0.0477
0.0846
-0.0684
-0.0893
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0.0739
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0.0357
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0.0913
0.2705
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-0.0237
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0.0573
0.0396

0.0096
0.1056
0.0721
-0.1698
0.0622
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0.0127
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-0.0923
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0.1373
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0.0298
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-0.0159
-0.0976

0.0013
0.0675
-0.1027
-0.0081
-0.0611
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-0.0949
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0.0595
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-0.0011
0.0017
-0.0345
-0.0827
0.0996
0.0138
0.0270
0.0419
0.0013
-0.1109
0.0520
-0.0367
-0.0511
0.1035
0.0489
0.0294
0.0474
0.2445
0.0073
0.1572
0.0585
0.0710
-0.0262
0.1275
0.0214
0.1871
-0.1036
-0.0941
-0.0868
0.0109

-0.0468
0.0364
-0.0213
0.1225
0.0335
-0.0861
0.0448
-0.0864
-0.1509
0.1058
0.1418
-0.0911
-0.0605
-0.0416
-0.1195
0.1675
-0.0326
-0.1515
0.1214
-0.0944
-0.0026
-0.0557
-0.0312
0.1319
0.0415
0.1054
0.0447
0.0839
-0.0064
-0.0457
-0.0412
-0.0062
0.0353
0.0232
0.1398
0.0190
0.0023
-0.0247
-0.0625
0.2187
0.0590
0.1453

-0.0778
0.1780
0.1717
-0.1733
0.1369
-0.0232
0.0710
-0.0772
-0.1197
0.1088
0.0951
-0.0551
0.0737
-0.1722
0.1567
0.0619
0.0185
0.0850
0.1259
-0.0385
-0.0097
-0.1275
-0.0331
-0.0650
0.1424
-0.0815
0.0076
-0.0210
-0.0463
0.1246
0.0154
-0.0480
0.1894
-0.0672
0.1302
-0.0011
0.0008
0.1660
0.0587
-0.0682
-0.0482
-0.0571

-0.0945
-0.1078
-0.1589
0.0748
0.0573
0.1371
0.1006
-0.1226
-0.0794
0.0926
-0.0135
-0.0718
0.0988
0.0173
0.0453
0.1266
0.0924
0.1304
0.1196
-0.0134
0.0334
-0.0546
-0.0646
0.0473
0.0960
-0.0243
0.0594
-0.0078
0.0359
0.1278
-0.1178
0.0499
-0.0187
0.1512
-0.0130
-0.0052
-0.1218
0.1010
-0.0936
0.0394
-0.0493
0.0201

-0.1632
-0.0681
-0.1343
0.0125
-0.1128
-0.1136
0.0534
-0.1567
-0.0491
-0.0039
0.1240
0.0466
-0.1290
0.0157
-0.0075
-0.0322
0.0223
-0.0451
0.0840
-0.0105
0.0586
0.0247
-0.0386
0.3370
0.0202
0.1230
0.0840
0.0931
-0.0510
-0.0283
0.0427
-0.1081
-0.0265
0.0925
0.0324
-0.0594
-0.0585
-0.0259
-0.2648
-0.0687
-0.0039
0.0021

-0.0015
0.0739
0.0710
0.0039
-0.0050
-0.0577
-0.0431
0.1263
0.0054
-0.0111
-0.0951
-0.0843
-0.0322
0.1920
-0.0811
0.1703
0.1161
0.0858
-0.0207
0.0325
-0.0435
-0.0793
-0.1132
-0.0504
0.0367
-0.0126
-0.0605
0.0228
-0.0232
0.1516
-0.0053
0.0079
0.0854
0.0785
0.0630
-0.0935
0.0398
0.0028
0.0237
-0.0924
-0.0626
-0.0607

-0.1386
0.0762
-0.0110
-0.0239
-0.1040
0.0291
-0.0758
0.0742
-0.0305
0.0199
-0.0525
0.0010
-0.1473
-0.0033
0.1024
-0.0096
-0.0933
-0.0076
-0.0765
0.0772
-0.0201
-0.0687
-0.0642
0.0135
-0.2683
0.0558
-0.1181
0.0428
-0.0433
-0.1521
-0.0125
0.1315
0.1121
0.0510
-0.1072
-0.0906
-0.0340
0.0323
-0.1274
0.0333
0.0914
-0.0041

-0.1859
-0.0697
-0.0178
0.0084
0.0193
0.1110
0.0685
0.1606
-0.0524
-0.1891
0.0995
-0.0268
0.0402
-0.1050
-0.0410
0.1093
0.0454
-0.0380
-0.0917
-0.1157
-0.1084
-0.0036
-0.0655
-0.0229
-0.0924
-0.0764
-0.1743
-0.0243
0.0833
-0.0758
0.1861
-0.0857
0.0159
0.1393
0.0048
-0.0972
-0.0690
-0.0618
-0.0404
0.0560
0.1662
0.0117

0.0235
-0.0579
0.1354
-0.1126
-0.0457
-0.0273
0.0760
0.1120
0.1030
0.0087
0.1378
-0.0451
-0.0364
0.1384
-0.0001
0.0307
-0.0266
0.0426
0.0283
0.0475
-0.0491
0.0240
-0.0479
-0.0049
0.0055
-0.0420
0.2245
-0.0996
0.0123
0.0866
-0.1083
0.0051
0.1226
-0.0679
-0.0728
0.0371
-0.0123
0.0857
-0.1048
0.0667
0.0762
-0.1479

-0.0557
-0.0507
0.1484
-0.0633
-0.0433
-0.0130
0.0244
-0.0762
-0.1561
-0.0925
0.0001
-0.0490
0.1255
0.0883
-0.0757
-0.0030
-0.0871
-0.1285
-0.1217
-0.0302
-0.0238
0.0306
0.0482
0.1187
-0.0853
-0.1080
0.0334
-0.0277
-0.0718
-0.0345
-0.0312
-0.0436
0.0454
0.0896
0.1130
-0.0486
0.0118
-0.0882
-0.0289
0.0939
0.1097
-0.0210

0.0446
0.0280
-0.0507
-0.0134
-0.0997
0.0027
-0.0551
-0.1295
0.0094
0.0788
-0.0837
0.0353
-0.0486
-0.0693
-0.0180
-0.0059
0.0181
0.0420
0.1873
0.0334
-0.1335
-0.0074
-0.0064
-0.0952
0.0576
0.0627
-0.0319
0.0136
-0.0353
-0.0009
0.1720
-0.0064
-0.0558
0.0785
0.0809
-0.0358
-0.1049
-0.0483
-0.0145
-0.0477
0.1444
0.0239

-0.1112
0.0531
-0.0016
-0.1141
0.0501
0.2040
-0.0474
0.1947
0.0335
-0.1239
-0.1826
0.1878
0.1255
0.0529
-0.0782
0.0679
0.0246
-0.0090
-0.0368
-0.0196
0.0904
-0.1681
0.1941
0.1021
-0.0041
-0.0471
-0.0422
0.0221
0.0549
0.0364
-0.0896
-0.0252
0.0543

>> autocorrSingleRealization

autocorrSingleRealization =

Columns 1 through 15

-0.0007 0.0007 -0.0012 0.0017 0.0030 -0.0058 -0.0035 0.0045 0.0027 -0.0050 0.0000 0.0141 0.0075 -0.0101 -0.0133

Columns 16 through 30

0.0075 0.0080 -0.0046 -0.0057 0.0049 0.0189 -0.0004 -0.0118 0.0007 0.0011 0.0093 0.0025 0.0033 -0.0012 0.0003

Columns 31 through 45

0.0036 -0.0135 0.0083 -0.0015 0.0093 -0.0091 0.0200 -0.0024 -0.0066 -0.0036 0.0121 0.0249 -0.0061 -0.0085 0.0175

Columns 46 through 60

0.0154 -0.0171 -0.0270 0.0140 0.0214 -0.0027 0.0126 0.0154 0.0193 -0.0134 -0.0175 -0.0118 0.0009 0.0066 -0.0084

Columns 61 through 75

-0.0056 0.0109 0.0048 0.0044 -0.0277 -0.0005 0.0164 0.0001 -0.0114 0.0096 0.0218 -0.0114 -0.0299 0.0071 0.0610

Columns 76 through 90

0.0073 -0.0179 0.0059 0.0098 -0.0325 -0.0169 0.0127 0.0167 -0.0187 0.0099 0.0004 0.0067 -0.0634 0.0101 0.0136

Columns 91 through 105

0.0033 0.0099 0.0116 -0.0150 -0.0182 0.0073 -0.0032 -0.0169 0.0164 0.0572 0.0213 -0.0012 0.0119 0.0386 0.0139

Columns 106 through 120

0.0021 -0.0273 0.0180 -0.0203 0.0046 -0.0077 0.0348 -0.0373 0.0079 0.0129 0.0157 0.0148 -0.0233 -0.0255 -0.0226

Columns 121 through 135

-0.0075 0.0053 -0.0022 -0.0233 0.0711 0.0045 0.0230 -0.0188 0.0368 0.0199 -0.0551 -0.0187 0.0018 -0.0070 -0.0164

Columns 136 through 150

0.0086 0.0187 -0.0421 0.0035 0.0385 0.0178 -0.0796 -0.0264 -0.0266 0.0021 0.0078 -0.0099 -0.0354 -0.0302 0.0199

Columns 151 through 165

0.0271 0.0259 -0.0299 -0.0016 -0.0048 -0.0139 -0.0508 0.0120 -0.0062 -0.0201 -0.0052 0.0405 0.0481 -0.0075 0.0100

Columns 166 through 180

0.0057 -0.0338 -0.0184 -0.0021 0.0477 -0.0108 -0.0379 0.0137 0.0182 -0.0372 -0.0357 0.0612 0.0163 -0.0361 -0.0034

Columns 181 through 195

0.0156 -0.0347 -0.0348 0.0071 0.0358 0.0109 -0.0006 0.0160 -0.0002 -0.0008 0.0263 -0.0118 0.0110 -0.0101 -0.0237

Columns 196 through 210

-0.0616 -0.0196 -0.0396 0.0045 -0.0242 0.0183 0.0429 0.0388 -0.0456 -0.0386 -0.0018 0.0049 -0.0677 0.0117 0.0187

Columns 211 through 225

0.0003 0.0052 0.0532 0.0084 -0.0487 -0.0192 -0.0549 0.0099 0.0031 0.0147 -0.0278 -0.0204 -0.0048 0.0018 -0.0349

Columns 226 through 240

0.0172 0.0521 0.0229 0.0197 -0.0260 0.0173 -0.0141 0.0068 0.0488 0.0098 0.0403 -0.0584 0.0178 0.0189 -0.0666

Columns 241 through 255

-0.0457 0.0113 0.0227 -0.0273 -0.0589 -0.0315 -0.0416 -0.0288 0.0401 0.0403 -0.0059 -0.0063 0.0153 -0.0045 -0.0217

Columns 256 through 270

0.0019 0.0695 0.0086 0.0565 0.0092 0.0219 -0.0152 0.0159 0.0231 0.0723 -0.0541 0.0319 0.0270 -0.0042 -0.0418

Columns 271 through 285

-0.0246 0.0216 -0.0583 0.0274 0.0028 0.0053 -0.0759 0.0082 -0.0098 0.0075 -0.0562 0.0840 0.0062 0.0233 0.0313

Columns 286 through 300

0.0058 0.0164 -0.0334 0.0151 -0.0495 -0.0503 0.0639 0.0490 0.0267 -0.0414 -0.0383 -0.0111 0.0162 0.0294 0.0299

Columns 301 through 315

0.0502 -0.0729 -0.0030 -0.0032 -0.0232 -0.0822 0.0214 -0.0068 -0.0122 0.0096 0.0425 -0.0386 -0.0358 -0.0162 -0.0243

Columns 316 through 330

-0.0050 -0.0190 0.0169 0.0071 0.0216 -0.0057 0.0196 -0.0201 -0.0409 -0.0044 0.0050 -0.0541 -0.0176 0.0043 0.0220

Columns 331 through 345

-0.0623 0.0400 0.0339 -0.0042 -0.0102 0.0477 -0.0086 -0.0080 -0.0509 0.0600 0.0510 0.0831 0.0211 0.0053 0.0245

Columns 346 through 360

-0.0587 0.0513 0.0399 -0.0207 -0.0993 0.0087 -0.0118 -0.0173 -0.1014 -0.0488 -0.0252 -0.0165 0.0644 -0.0484 -0.0061

Columns 361 through 375

-0.0444 0.0348 -0.0231 -0.0214 0.0669 0.0353 0.0325 0.0152 0.0408 -0.0164 0.0220 0.0258 0.0152 -0.0442 -0.1502

Columns 376 through 390

0.0316 -0.0386 0.0064 -0.0671 -0.0264 0.0539 -0.0147 0.0298 0.0343 -0.0577 0.0126 -0.0043 -0.0242 -0.0367 0.0075

Columns 391 through 405

0.0736 -0.0181 -0.0063 0.0078 -0.0906 -0.0244 -0.0575 0.0219 -0.0286 -0.0942 0.0480 0.0482 -0.0174 -0.0654 -0.0290

Columns 406 through 420

0.0079 -0.0624 0.0242 0.0405 -0.0402 -0.0495 0.0291 0.0484 -0.0007 0.0043 0.0109 0.0222 0.0056 -0.0226 0.0527

Columns 421 through 435

-0.0327 -0.0412 0.0044 0.0101 -0.0141 -0.0197 0.1151 0.0368 -0.0138 -0.0096 0.0191 -0.0136 -0.0772 0.0674 0.0224

Columns 436 through 450

-0.0045 -0.0385 0.0578 -0.0100 -0.0337 -0.0294 0.0438 -0.0646 -0.0053 -0.0257 0.0043 -0.0702 -0.0374 0.0242 0.0791

Columns 451 through 465

0.0682 0.0691 0.0072 0.0099 -0.0008 0.0322 -0.0114 -0.0099 0.0180 0.0417 -0.0674 -0.0096 0.0230 0.0579 -0.0065

Columns 466 through 480

-0.0158 0.0497 -0.0464 -0.0642 -0.0148 0.0881 -0.0260 -0.0478 0.0450 0.1519 0.0255 0.0153 0.0085 0.0330 -0.0350

Columns 481 through 495

-0.0248 -0.0350 -0.0259 0.0014 0.0300 -0.0393 -0.0605 -0.0446 0.0333 0.0227 -0.0257 -0.0038 0.0820 -0.0252 -0.0373

Columns 496 through 510

0.0869 -0.0219 0.0039 0.0748 1.0000 0.0748 0.0039 -0.0219 0.0869 -0.0373 -0.0252 0.0820 -0.0038 -0.0257 0.0227

Columns 511 through 525

0.0333 -0.0446 -0.0605 -0.0393 0.0300 0.0014 -0.0259 -0.0350 -0.0248 -0.0350 0.0330 0.0085 0.0153 0.0255 0.1519

Columns 526 through 540

0.0450 -0.0478 -0.0260 0.0881 -0.0148 -0.0642 -0.0464 0.0497 -0.0158 -0.0065 0.0579 0.0230 -0.0096 -0.0674 0.0417

Columns 541 through 555

0.0180 -0.0099 -0.0114 0.0322 -0.0008 0.0099 0.0072 0.0691 0.0682 0.0791 0.0242 -0.0374 -0.0702 0.0043 -0.0257

Columns 556 through 570

-0.0053 -0.0646 0.0438 -0.0294 -0.0337 -0.0100 0.0578 -0.0385 -0.0045 0.0224 0.0674 -0.0772 -0.0136 0.0191 -0.0096

Columns 571 through 585

-0.0138 0.0368 0.1151 -0.0197 -0.0141 0.0101 0.0044 -0.0412 -0.0327 0.0527 -0.0226 0.0056 0.0222 0.0109 0.0043

Columns 586 through 600

-0.0007 0.0484 0.0291 -0.0495 -0.0402 0.0405 0.0242 -0.0624 0.0079 -0.0290 -0.0654 -0.0174 0.0482 0.0480 -0.0942

Columns 601 through 615

-0.0286 0.0219 -0.0575 -0.0244 -0.0906 0.0078 -0.0063 -0.0181 0.0736 0.0075 -0.0367 -0.0242 -0.0043 0.0126 -0.0577

Columns 616 through 630

0.0343 0.0298 -0.0147 0.0539 -0.0264 -0.0671 0.0064 -0.0386 0.0316 -0.1502 -0.0442 0.0152 0.0258 0.0220 -0.0164

Columns 631 through 645

0.0408 0.0152 0.0325 0.0353 0.0669 -0.0214 -0.0231 0.0348 -0.0444 -0.0061 -0.0484 0.0644 -0.0165 -0.0252 -0.0488

Columns 646 through 660

-0.1014 -0.0173 -0.0118 0.0087 -0.0993 -0.0207 0.0399 0.0513 -0.0587 0.0245 0.0053 0.0211 0.0831 0.0510 0.0600

Columns 661 through 675

-0.0509 -0.0080 -0.0086 0.0477 -0.0102 -0.0042 0.0339 0.0400 -0.0623 0.0220 0.0043 -0.0176 -0.0541 0.0050 -0.0044

Columns 676 through 690

-0.0409 -0.0201 0.0196 -0.0057 0.0216 0.0071 0.0169 -0.0190 -0.0050 -0.0243 -0.0162 -0.0358 -0.0386 0.0425 0.0096

Columns 691 through 705

-0.0122 -0.0068 0.0214 -0.0822 -0.0232 -0.0032 -0.0030 -0.0729 0.0502 0.0299 0.0294 0.0162 -0.0111 -0.0383 -0.0414

Columns 706 through 720

0.0267 0.0490 0.0639 -0.0503 -0.0495 0.0151 -0.0334 0.0164 0.0058 0.0313 0.0233 0.0062 0.0840 -0.0562 0.0075

Columns 721 through 735

-0.0098 0.0082 -0.0759 0.0053 0.0028 0.0274 -0.0583 0.0216 -0.0246 -0.0418 -0.0042 0.0270 0.0319 -0.0541 0.0723

Columns 736 through 750

0.0231 0.0159 -0.0152 0.0219 0.0092 0.0565 0.0086 0.0695 0.0019 -0.0217 -0.0045 0.0153 -0.0063 -0.0059 0.0403

Columns 751 through 765

0.0401 -0.0288 -0.0416 -0.0315 -0.0589 -0.0273 0.0227 0.0113 -0.0457 -0.0666 0.0189 0.0178 -0.0584 0.0403 0.0098

Columns 766 through 780

0.0488 0.0068 -0.0141 0.0173 -0.0260 0.0197 0.0229 0.0521 0.0172 -0.0349 0.0018 -0.0048 -0.0204 -0.0278 0.0147

Columns 781 through 795

0.0031 0.0099 -0.0549 -0.0192 -0.0487 0.0084 0.0532 0.0052 0.0003 0.0187 0.0117 -0.0677 0.0049 -0.0018 -0.0386

Columns 796 through 810

-0.0456 0.0388 0.0429 0.0183 -0.0242 0.0045 -0.0396 -0.0196 -0.0616 -0.0237 -0.0101 0.0110 -0.0118 0.0263 -0.0008

Columns 811 through 825

-0.0002 0.0160 -0.0006 0.0109 0.0358 0.0071 -0.0348 -0.0347 0.0156 -0.0034 -0.0361 0.0163 0.0612 -0.0357 -0.0372

Columns 826 through 840

0.0182 0.0137 -0.0379 -0.0108 0.0477 -0.0021 -0.0184 -0.0338 0.0057 0.0100 -0.0075 0.0481 0.0405 -0.0052 -0.0201

Columns 841 through 855

-0.0062 0.0120 -0.0508 -0.0139 -0.0048 -0.0016 -0.0299 0.0259 0.0271 0.0199 -0.0302 -0.0354 -0.0099 0.0078 0.0021

Columns 856 through 870

-0.0266 -0.0264 -0.0796 0.0178 0.0385 0.0035 -0.0421 0.0187 0.0086 -0.0164 -0.0070 0.0018 -0.0187 -0.0551 0.0199

Columns 871 through 885

0.0368 -0.0188 0.0230 0.0045 0.0711 -0.0233 -0.0022 0.0053 -0.0075 -0.0226 -0.0255 -0.0233 0.0148 0.0157 0.0129

Columns 886 through 900

0.0079 -0.0373 0.0348 -0.0077 0.0046 -0.0203 0.0180 -0.0273
0.0021 0.0139 0.0386 0.0119 -0.0012 0.0213 0.0572

Columns 901 through 915

0.0164 -0.0169 -0.0032 0.0073 -0.0182 -0.0150 0.0116 0.0099
0.0033 0.0136 0.0101 -0.0634 0.0067 0.0004 0.0099

Columns 916 through 930

-0.0187 0.0167 0.0127 -0.0169 -0.0325 0.0098 0.0059 -0.0179
0.0073 0.0610 0.0071 -0.0299 -0.0114 0.0218 0.0096

Columns 931 through 945

-0.0114 0.0001 0.0164 -0.0005 -0.0277 0.0044 0.0048 0.0109 -
0.0056 -0.0084 0.0066 0.0009 -0.0118 -0.0175 -0.0134

Columns 946 through 960

0.0193 0.0154 0.0126 -0.0027 0.0214 0.0140 -0.0270 -0.0171
0.0154 0.0175 -0.0085 -0.0061 0.0249 0.0121 -0.0036

Columns 961 through 975

-0.0066 -0.0024 0.0200 -0.0091 0.0093 -0.0015 0.0083 -0.0135
0.0036 0.0003 -0.0012 0.0033 0.0025 0.0093 0.0011

Columns 976 through 990

0.0007 -0.0118 -0.0004 0.0189 0.0049 -0.0057 -0.0046 0.0080
0.0075 -0.0133 -0.0101 0.0075 0.0141 0.0000 -0.0050

Columns 991 through 999

0.0027 0.0045 -0.0035 -0.0058 0.0030 0.0017 -0.0012 0.0007 -
0.0007

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