Problem 3

```matlab
for i = 1 : 3
    A = 3 + 3*randn(1000,1);
    B = 5 + 5*randn(1000,1);
    C = A + B;
    D = 3*A + 4*B;
    E = 3*A - 4*B;

    DATA = [A B C D E];

    % Part A - Find Mean and Variance for A, B, C, D, and E

    meanA(i) = mean(A);
    meanB(i) = mean(B);
    meanC(i) = mean(C);
    meanD(i) = mean(D);
    meanE(i) = mean(E);

    varA(i) = var(A);
    varB(i) = var(B);
    varC(i) = var(C);
    varD(i) = var(D);
    varE(i) = var(E);

    meanDATA(i,:) = mean(DATA);

    covDATA(:,:,i) = cov(DATA);

    fprintf("\nSequence %g\n",i)
    fprintf("--------------------------\n")
    fprintf("Mean A = %.4f\n",meanA(i))
    fprintf("Mean B = %.4f\n",meanB(i))
    fprintf("Mean C = %.4f\n",meanC(i))
    fprintf("Mean D = %.4f\n",meanD(i))
    fprintf("Mean E = %.4f\n\n",meanE(i))

    fprintf("Var A = %.4f\n",varA(i))
    fprintf("Var B = %.4f\n",varB(i))
    fprintf("Var C = %.4f\n",varC(i))
    fprintf("Var D = %.4f\n",varD(i))
    fprintf("Var E = %.4f\n\n",varE(i))

    fprintf("Mean DATA = \n")
    fprintf("%.4f %.4f %.4f %.4f %.4f\n\n",meanDATA(i,:))

    fprintf("Cov DATA = \n")
    fprintf("%10.4f %10.4f %10.4f %10.4f %10.4f\n",covDATA(:,:,i))

end

subplot(2,1,1)
```

```
hold on
grid on
plot(meanA,'.')
plot(meanB,'.')
plot(meanC,'.')
plot(meanD,'.')
plot(meanE,'.')
title("Mean for Each Sequence")
xlabel("Sequence Number")
xlim([0,4])
ylabel("Mean")
legend('A','B','C','D','E')
subplot(2,1,2)
hold on
grid on
plot(varA,'.')
plot(varB,'.')
plot(varC,'.')
plot(varD,'.')
plot(varE,'.')
title("Variance for Each Sequence")
xlabel("Sequence Number")
xlim([0,4])
ylabel("Variance")
legend('A','B','C','D','E')
```

Sequence 1

Mean A = 3.0323
Mean B = 4.9381
Mean C = 7.9704
Mean D = 28.8492
Mean E = -10.6554

Var A = 9.8805
Var B = 23.8376
Var C = 34.3893
Var D = 478.3805
Var E = 462.2711

Mean DATA =
3.0323 4.9381 7.9704 28.8492 -10.6554

Cov DATA =
```
    9.8805      0.3356     10.2161      30.9839      28.2990
    0.3356     23.8376     24.1732      96.3572     -94.3435
   10.2161     24.1732     34.3893     127.3411     -66.0445
   30.9839     96.3572    127.3411     478.3805    -292.4771
   28.2990    -94.3435    -66.0445    -292.4771     462.2711
```

Sequence 2

Mean A = 3.1294

Mean B = 5.1190
Mean C = 8.2484
Mean D = 29.8642
Mean E = -11.0880

Var A = 9.6488
Var B = 25.3918
Var C = 33.5202
Var D = 474.8636
Var E = 511.3524

Mean DATA =
3.1294 5.1190 8.2484 29.8642 -11.0880

Cov DATA =
```
    9.6488    -0.7602     8.8886     25.9057     31.9871
   -0.7602    25.3918    24.6316     99.2866   -103.8477
    8.8886    24.6316    33.5202    125.1923    -71.8606
   25.9057    99.2866   125.1923    474.8636   -319.4296
   31.9871  -103.8477   -71.8606   -319.4296    511.3524
```
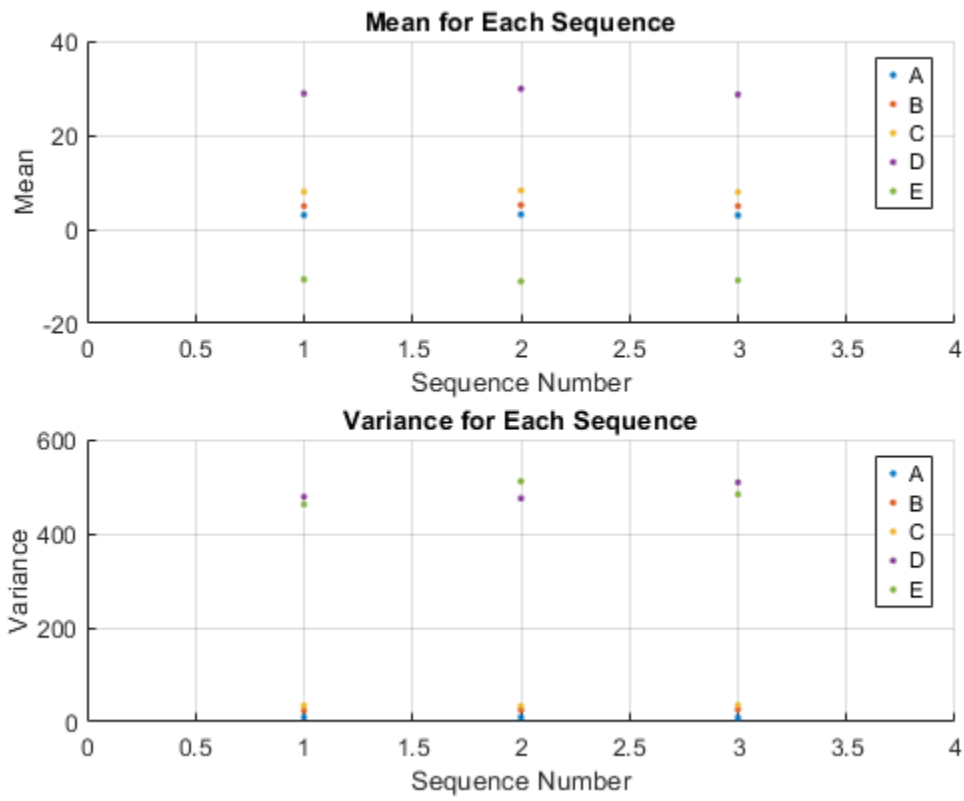
Sequence 3

Mean A = 2.9620
Mean B = 4.9333
Mean C = 7.8953
Mean D = 28.6194
Mean E = -10.8474

Var A = 8.2828
Var B = 26.3509
Var C = 35.6757
Var D = 508.6640
Var E = 483.6548

Mean DATA =
2.9620 4.9333 7.8953 28.6194 -10.8474

Cov DATA =
```
    8.2828     0.5210     8.8038     26.9325     22.7643
    0.5210    26.3509    26.8719    106.9666   -103.8405
    8.8038    26.8719    35.6757    133.8991    -81.0762
   26.9325   106.9666   133.8991    508.6640   -347.0692
   22.7643  -103.8405   -81.0762   -347.0692    483.6548
```

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