Table of Contents

Eric Wan - ezw23@drexel.edu	1
Problem 1	1
Problem 2	1
Problem 3	2
Problem 4	2
Problem 5	3
^^ Doing RREF manually with Gauss-Jordan Elimination ^^	8
Problem 6	

Eric Wan - ezw23@drexel.edu

```
A = [2 \ 1 \ 4 \ 9 \ 6; \ 7 \ 1 \ 0 \ 5 \ -1; \ 32 \ 0 \ 1 \ 0 \ 3; \ -2 \ 0 \ 1 \ 22 \ -2; \ -51 \ 0 \ 0 \ -3 \ 4]; \ % Set A
B = [13; \ 5; \ 68; \ 17; \ -6]; \ % Set B
```

Problem 1

```
detA = det(A); % Determinant of A
invA = inv(A); % Inverse of A
detinvA = det(invA)
det1A = 1 / detA % Proving equality
% Matrix A is invertible beacuse it has a determinant not equal to 0

detinvA =
    -7.0102e-05
det1A =
    -7.0102e-05
```

Problem 2

```
A1 = A + 1; % New matrix of A + 1
det(A) * det(A1)
det(A * A1) % Proving equality

ans =
   2.7385e+08
```

ans = 2.7385e+08

Problem 3

```
invA = inv(A); % Calling invA again
invA * A
A * invA % Proving equality to I
ans =
   1.0000
                     -0.0000
                  0
   -0.0000
            1.0000
                      -0.0000
                               -0.0000
                                           0.0000
                               -0.0000
                                           0.0000
                       1.0000
        0
                  0
                       0.0000
                                1.0000
    0.0000
                  0
                                         -0.0000
                  0
                       0.0000
        0
                                     0
                                          1.0000
ans =
    1.0000
             0.0000
                      0.0000
                                -0.0000
                                           0.0000
             1.0000
                              -0.0000
        0
        0
                       1.0000
                              -0.0000
                                          0.0000
                  0
   -0.0000
            0.0000
                           0
                                1.0000
                                          -0.0000
    0.0000
            -0.0000
                           0
                                -0.0000
                                           1.0000
```

Problem 4

-0.5556

-0.1291

```
I = eye(5); % Identity matrix 5x5
AI = [A,I]; % Creating matrix [A, I]
rref(AI)
IinvA = [I,invA] % Proving equality
ans =
 Columns 1 through 7
    1.0000
                                                0 -0.0051
                                                            0.0051
                  0
                            0
                                     0
             1.0000
                           0
                                                    0.0871
                                                               0.9129
        0
                                     0
                                                0
                       1.0000
         0
                  0
                                      0
                                                0
                                                     0.4212
                                                              -0.4212
                                 1.0000
        0
                  0
                            0
                                                0
                                                    -0.0274
                                                               0.0274
         0
                           0
                                                    -0.0858
                                    0
                                           1.0000
                                                               0.0858
  Columns 8 through 10
   0.0204
            0.0001
                      -0.0063
   -0.1142
            -0.2341
                       0.0662
```

-0.3849

```
0.0545
               0.0552
                          0.0347
    0.3009
               0.0423
                          0.1956
IinvA =
  Columns 1 through 7
    1.0000
                    0
                               0
                                          0
                                                     0
                                                         -0.0051
                                                                     0.0051
               1.0000
         0
                               Ω
                                          0
                                                     0
                                                          0.0871
                                                                     0.9129
         0
                          1.0000
                                                          0.4212
                    0
                                          0
                                                     0
                                                                    -0.4212
         0
                    0
                               0
                                     1.0000
                                                     0
                                                         -0.0274
                                                                     0.0274
                                                1.0000
                                                         -0.0858
         0
                    0
                               0
                                          0
                                                                     0.0858
  Columns 8 through 10
    0.0204
               0.0001
                         -0.0063
   -0.1142
              -0.2341
                          0.0662
   -0.5556
              -0.1291
                         -0.3849
    0.0545
              0.0552
                          0.0347
    0.3009
               0.0423
                          0.1956
```

Problem 5

```
augAB = [A,B] % Setting AB
% vv Doing RREF manually with Gauss-Jordan Elimination vv
augAB(4,:) = augAB(4,:) + augAB(1,:)
augAB(3,:) = augAB(3,:) - 16 * augAB(1,:)
augAB(5,:) = augAB(5,:) + 7 * augAB(2,:)
augAB(5,:) = augAB(5,:) + augAB(1,:)
augAB(1,:) = 0.5 * augAB(1,:)
augAB(2,:) = augAB(2,:) - 7 * augAB(1,:)
augAB(5,:) = augAB(5,:) - 8 * augAB(4,:)
augAB(3,:) = augAB(3,:) + 16 * augAB(4,:)
augAB(2,:) = augAB(2,:) + 2.5 * augAB(4,:)
augAB(2,:) = augAB(2,:) / -1.5
augAB(3,:) = augAB(3,:) - 17 * augAB(2,:)
augAB(5,:) = augAB(5,:) + 36 * augAB(2,:)
augAB(3,:) = augAB(3,:) / 930
augAB(5,:) = augAB(5,:) / - 1431
augAB(5,:) = augAB(5,:) - augAB(3,:)
augAB(5,:) = augAB(5,:) / ((augAB(5,5)))
augAB(1,:) = augAB(1,:) - 0.5 * augAB(4,:)
augAB(1,:) = augAB(1,:) + 0.5 * augAB(2,:)
augAB(4,:) = augAB(4,:) - 5 * augAB(2,:)
augAB(1,:) = augAB(1,:) + 28 * augAB(3,:)
augAB(2,:) = augAB(2,:) + 34 * augAB(3,:)
augAB(4,:) = augAB(4,:) - 201 * augAB(3,:)
augAB(1,:) = augAB(1,:) - augAB(1,5) * augAB(5,:)
augAB(2,:) = augAB(2,:) - augAB(2,5) * augAB(5,:)
augAB(3,:) = augAB(3,:) - augAB(3,5) * augAB(5,:)
augAB(4,:) = augAB(4,:) - augAB(4,5) * augAB(5,:)
```

```
augAB =
    2
              4
                        6 13
         1
    7
                              5
         1
               0
                   5
                        -1
   32
         0
               1
                   0
                              68
                         3
   -2
         0
               1
                   22
                        -2
                              17
  -51
         0
               0
                   -3
                        4
                              -6
augAB =
    2
         1
              4
                   9
                         6
                              13
    7
         1
                    5
                              5
               0
                         -1
   32
         0
               1
                   0
                         3
                              68
   0
         1
               5
                   31
                         4
                              30
  -51
         0
               0
                   -3
                          4
                              -6
augAB =
    2
         1
             4
                  9
                           13
                        6
    7
         1
             0
                   5
                        -1
                              5
        -16
             -63 -144
                        -93 -140
    0
         1
              5
                   31
                              30
    0
                        4
                   -3
  -51
         0
               0
                         4
                              -6
augAB =
    2
         1
             4
                  9
                        6
                              13
    7
         1
              0
                   5
                         -1
                              5
    0
        -16
             -63 -144
                        -93 -140
    0
         1
              5
                   31
                              30
                        4
         7
               0
                   32
                              29
   -2
                         -3
augAB =
                  9
    2
         1
             4
                              13
                        6
    7
         1
             0
                   5
                        -1
                              5
    0
       -16
                        -93 -140
             -63 -144
    0
         1
              5
                   31
                         4
                              30
    0
         8
               4
                   41
                         3
                              42
augAB =
   1.0000
            0.5000
                     2.0000
                              4.5000
                                       3.0000
                                                6.5000
   7.0000
            1.0000
                              5.0000
                                      -1.0000
                                                5.0000
       0 -16.0000 -63.0000 -144.0000 -93.0000 -140.0000
```

31.0000

41.0000

4.0000

3.0000

30.0000

42.0000

5.0000

4.0000

1.0000

8.0000

```
auqAB =
    1.0000
                                            3.0000
             0.5000
                        2.0000
                                   4.5000
                                                       6.5000
             -2.5000
                      -14.0000
                                -26.5000
                                          -22.0000 -40.5000
         0
         0
            -16.0000
                      -63.0000 -144.0000
                                           -93.0000 -140.0000
              1.0000
                        5.0000
                                  31.0000
         0
                                             4.0000
                                                       30.0000
         0
              8.0000
                        4.0000
                                  41.0000
                                             3.0000
                                                       42.0000
augAB =
    1.0000
             0.5000
                        2.0000
                                   4.5000
                                            3.0000
                                                       6.5000
             -2.5000
                     -14.0000
                                -26.5000
                                          -22.0000
                                                     -40.5000
         0
                     -63.0000 -144.0000
                                           -93.0000 -140.0000
         0
            -16.0000
         0
              1.0000
                        5.0000
                                  31.0000
                                             4.0000
                                                       30.0000
         0
                   0 -36.0000 -207.0000
                                           -29.0000 -198.0000
augAB =
    1.0000
              0.5000
                        2.0000
                                   4.5000
                                            3.0000
                                                       6.5000
         0
             -2.5000
                     -14.0000
                                -26.5000
                                          -22.0000
                                                    -40.5000
         0
                       17.0000
                                352.0000
                                           -29.0000
                                                     340.0000
                   0
              1.0000
         0
                        5.0000
                                  31.0000
                                             4.0000
                                                       30.0000
         0
                   0 -36.0000 -207.0000
                                          -29.0000 -198.0000
augAB =
              0.5000
    1.0000
                        2.0000
                                   4.5000
                                            3.0000
                                                       6.5000
         0
                   0
                       -1.5000
                                  51.0000
                                           -12.0000
                                                      34.5000
         0
                       17.0000
                                352.0000
                                           -29.0000
                                                     340.0000
                   0
              1.0000
                        5.0000
                                  31.0000
         0
                                             4.0000
                                                       30.0000
                   0 -36.0000 -207.0000
         0
                                          -29.0000 -198.0000
augAB =
              0.5000
    1.0000
                        2.0000
                                   4.5000
                                             3.0000
                                                       6.5000
         0
                        1.0000
                                -34.0000
                                             8.0000
                                                     -23.0000
                   0
         0
                   0
                       17.0000
                                352.0000
                                           -29.0000
                                                     340.0000
              1.0000
                        5.0000
                                  31.0000
                                             4.0000
                                                       30.0000
         0
                      -36.0000 -207.0000
                                          -29.0000 -198.0000
         0
augAB =
    1.0000
              0.5000
                        2.0000
                                   4.5000
                                             3.0000
                                                       6.5000
         0
                   0
                        1.0000
                                -34.0000
                                             8.0000
                                                     -23.0000
         0
                                930.0000 -165.0000
                   0
                                                     731.0000
                              0
         0
              1.0000
                        5.0000
                                  31.0000
                                             4.0000
         0
                      -36.0000 -207.0000 -29.0000 -198.0000
```

augAB =						
1.0e+03 *						
0.0010 0 0 0 0	0.0005 0 0 0.0010 0	0.0020 0.0010 0 0.0050	0.0045 -0.0340 0.9300 0.0310 -1.4310	0.0030 0.0080 -0.1650 0.0040 0.2590	0.0065 -0.0230 0.7310 0.0300 -1.0260	
augAB =						
1.0e+03 *						
0.0010 0 0 0 0	0.0005 0 0 0.0010 0	0.0010	0.0045 -0.0340 0.0010 0.0310 -1.4310	0.0030 0.0080 -0.0002 0.0040 0.2590	0.0065 -0.0230 0.0008 0.0300 -1.0260	
augAB =						
1.0000 0 0 0	0.5000 0 0 1.0000 0	2.0000 1.0000 0 5.0000	4.5000 -34.0000 1.0000 31.0000 1.0000	3.0000 8.0000 -0.1774 4.0000 -0.1810	6.5000 -23.0000 0.7860 30.0000 0.7170	
augAB =						
1.0000 0 0 0 0	0.5000 0 0 1.0000 0	2.0000 1.0000 0 5.0000	4.5000 -34.0000 1.0000 31.0000	3.0000 8.0000 -0.1774 4.0000 -0.0036		
augAB =						
1.0000 0 0 0 0	0.5000 0 0 1.0000 0	2.0000 1.0000 0 5.0000	4.5000 -34.0000 1.0000 31.0000	3.0000 8.0000 -0.1774 4.0000 1.0000	6.5000 -23.0000 0.7860 30.0000 19.3230	
augAB =						
1.0000	0 0	-0.5000 1.0000	-11.0000 -34.0000	1.0000 8.0000	-8.5000 -23.0000	

0 0 0	0 1.0000 0	0 5.0000 0	1.0000 31.0000 0	-0.1774 4.0000 1.0000	0.7860 30.0000 19.3230
augAB =					
1.0000 0 0 0 0	0 0 0 1.0000 0	0 1.0000 0 5.0000 0	-28.0000 -34.0000 1.0000 31.0000	5.0000 8.0000 -0.1774 4.0000 1.0000	-20.0000 -23.0000 0.7860 30.0000 19.3230
augAB =					
1.0000 0 0 0 0	0 0 0 1.0000 0	0 1.0000 0 0	-28.0000 -34.0000 1.0000 201.0000	5.0000 8.0000 -0.1774 -36.0000 1.0000	-20.0000 -23.0000 0.7860 145.0000 19.3230
augAB =					
1.0000 0 0 0	0 0 0 1.0000 0	0 1.0000 0 0	0 -34.0000 1.0000 201.0000	0.0323 8.0000 -0.1774 -36.0000 1.0000	2.0086 -23.0000 0.7860 145.0000 19.3230
augAB =					
1.0000 0 0 0 0	0 0 0 1.0000 0	0 1.0000 0 0	0 0 1.0000 201.0000 0	0.0323 1.9677 -0.1774 -36.0000 1.0000	2.0086 3.7247 0.7860 145.0000 19.3230
augAB =					
1.0000 0 0 0	0 0 0 1.0000 0	0 1.0000 0 0	0 0 1.0000 0 0	0.0323 1.9677 -0.1774 -0.3387 1.0000	2.0086 3.7247 0.7860 -12.9903 19.3230
augAB =					
1.0000	<i>0</i> <i>0</i>	0 1.0000	<i>0 0</i>	0 1.9677	1.3853 3.7247

0 0 0	0 1.0000 0	0 0 0	1.0000 0 0		0.7860 -12.9903 19.3230
augAB =					
1.0000 0 0 0	0 0 0 1.0000 0	0 1.0000 0 0	0 0 1.0000 0 0	0 0 -0.1774 -0.3387 1.0000	1.3853 -34.2980 0.7860 -12.9903 19.3230
augAB =					
1.0000 0 0 0 0	0 0 0 1.0000 0	0 1.0000 0 0	0 0 1.0000 0 0	0 0 0 -0.3387 1.0000	1.3853 -34.2980 4.2143 -12.9903 19.3230
augAB =					
1.0000 0 0 0	0 0 0 1.0000 0	0 1.0000 0 0	0 0 1.0000 0	0 0 0 0 1.0000	1.3853 -34.2980 4.2143 -6.4454 19.3230

^^ Doing RREF manually with Gauss-Jordan Elimination **^^**

```
% Reorganizing matrix to RREF form
solrref = [augAB(1,:); augAB(4,:); augAB(2,:); augAB(3,:); augAB(5,:)]
rrefAB = rref(augAB) % Proving equality
solrref =
   1.0000
          0
                     0
                            0
                                        1.3853
          1.0000
                     0
                                    0 -6.4454
                             0
           0 1.0000
      0
                            0
                                    0 -34.2980
                  0 1.0000
                                        4.2143
                            0 1.0000 19.3230
             0
rrefAB =
   1.0000
            0
                   0 0 0 1.3853
```

0	1.0000	0	0	0	-6.4454
0	0	1.0000	0	0	-34.2980
0	0	0	1.0000	0	4.2143
0	0	0	0	1.0000	19.3230

Problem 6

Doing Cramer's rule 5 times for x1, x2, x3, x4, x5

```
Ax1 = A; % setting Ax1
Ax1(:,1) = B; % replacing column 1 of Ax1
x1 = det(Ax1) / det(A); % solving for x1
Ax2 = A;
Ax2(:,2) = B;
x2 = det(Ax2) / det(A);
Ax3 = A;
Ax3(:,3) = B;
x3 = det(Ax3) / det(A);
Ax4 = A;
Ax4(:,4) = B;
x4 = det(Ax4) / det(A);
Ax5 = A;
Ax5(:,5) = B;
x5 = det(Ax5) / det(A);
solcramer = [x1; x2; x3; x4; x5] % Reorganizing matrix solution
rrefAB(:,6) % Proving equality
solcramer =
    1.3853
   -6.4454
  -34.2980
   4.2143
   19.3230
ans =
    1.3853
   -6.4454
  -34.2980
    4.2143
   19.3230
```

Published with MATLAB® R2016a