CHE 1411L Week 10 Lab Assignment

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Problem 7.7

Use MATLAB to calculate the determinant of matrices A and B above. Does an inverse exist for each matrix? Check your results by calculating the determinants of matrices A and B by hand.

```
A = [1 3 0; 2 1 2; 4 1 3]
B = [0 1 1; 1 3 3; 2 0 3]

A_det = det(A)
B_det = det(B)

C = inv(A)
D = inv(B)
```

```
A =

     1     3     0
     2     1     2
     4     1     3


B =

     0     1     1
     1     3     3
     2     0     3


A_det =

     7


B_det =

    -3


C =

    0.1429   -1.2857    0.8571
    0.2857    0.4286   -0.2857
```

```
   -0.2857    1.5714   -0.7143
```

```
D =

   -3.0000    1.0000         0
   -1.0000    0.6667   -0.3333
    2.0000   -0.6667    0.3333
```

Problem 7.8

Use MATLAB to show that AA^-1 = A^-1A for matrices A and B above.

```
A_inA = A*C
inA_A = C*A
```

```
A_inA =

    1.0000         0         0
         0    1.0000   -0.0000
         0    0.0000    1.0000
```

```
inA_A =

    1.0000    0.0000         0
         0    1.0000         0
         0         0    1.0000
```

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$$A = \begin{vmatrix} 1 & 4 & 1 \\ 1 & 4 & 5 \\ 3 & 2 & 7 \end{vmatrix} \qquad B = \begin{vmatrix} 0 & 6 & 1 \\ 5 & 2 & 7 \\ 8 & 0 & 1 \end{vmatrix} \qquad A+B = \begin{vmatrix} 1 & 10 \\ 6 & 6 \\ 11 & 2 \end{vmatrix}$$

$$A2 = \begin{vmatrix} 1 & 2 & 0 \\ 3 & 5 & 5 \\ 2 & 2 & 1 \end{vmatrix} \qquad B2 = \begin{vmatrix} 1 & 6 \\ 2 & 2 \\ 1 & 2 \end{vmatrix} \qquad A2*B2 = \begin{vmatrix} 5 & 10 \\ 18 & 38 \\ 7 & 18 \end{vmatrix}$$

$k = 3$

$$k*B2 = \begin{vmatrix} 3 & 18 \\ 6 & 6 \\ 3 & 6 \end{vmatrix}$$

2
12
8

(A2*B2)T=	5	18	7
	10	38	18

$$A = \begin{vmatrix} 1 & 0 & 3 \\ 2 & 1 & 1 \\ 2 & 3 & 1 \end{vmatrix} \qquad \det(A) = 10$$

$$A^{-1} = \begin{vmatrix} -0.2 & 0.9 & -0.3 \\ 0 & -0.5 & 0.5 \\ 0.4 & -0.3 & 0.1 \end{vmatrix}$$

$$A^{-1}A = \begin{vmatrix} 1 & 1.11E\text{-}16 & -5.6E\text{-}17 \\ 0 & 1 & 0 \\ 5.55E\text{-}17 & 5.55E\text{-}17 & 1 \end{vmatrix}$$

Use excel to show that AA^-1 = A^-1A for matrices A and B.

$$A = \begin{vmatrix} 1 & 3 & 0 \\ 2 & 1 & 2 \\ 4 & 1 & 3 \end{vmatrix} \qquad A^{-1} = \begin{vmatrix} 0.14 & -1.29 \\ 0.29 & 0.43 \\ -0.29 & 1.57 \end{vmatrix}$$

$$AA^{-1} = \begin{vmatrix} 1.00 & 0.00 & 0.00 \\ 0.00 & 1.00 & 0.00 \\ 0.00 & 0.00 & 1.00 \end{vmatrix} \qquad A^{-1}A = \begin{vmatrix} 1.00 & 0.00 \\ 0.00 & 1.00 \\ 0.00 & 0.00 \end{vmatrix}$$

0.86
-0.29
-0.71

0.00
0.00
1.00

```
A=[1 0 2; 2 1 2; 0 2 1];
B=[1 0 1; 1 1 2; 3 3 1]
C1=A+B
C2=A*B
C3=2*C2

A1=[0 1 1; 2 3 1; 1 2 1]
B1=[1 2 2; 1 0 1]
%C2b=A1*B1 (this makes an error
B1=B1'
C2b=A1*B1

A2=[1 2 1; 0 2 0; 2 1 1]
B2=[1 2 3; 4 5 6; 7 8 9]
C4=inv(A2)
D=inv(B2)

detA2=det(A2)
detB2=det(B2)

A3=[1 2 1; 0 1 2]
B3=[1 2 0; 1 1 2]
C=inv(A3*B3')
```

```
B =

     1     0     1
     1     1     2
     3     3     1


C1 =

     2     0     3
     3     2     4
     3     5     2


C2 =

     7     6     3
     9     7     6
     5     5     5


C3 =

    14    12     6
    18    14    12
    10    10    10
```

```
A1 =

     0     1     1
     2     3     1
     1     2     1


B1 =

     1     2     2
     1     0     1


B1 =

     1     1
     2     0
     2     1


C2b =

     4     1
    10     3
     7     2


A2 =

     1     2     1
     0     2     0
     2     1     1


B2 =

     1     2     3
     4     5     6
     7     8     9


C4 =

   -1.0000    0.5000    1.0000
         0    0.5000         0
    2.0000   -1.5000   -1.0000

Warning: Matrix is close to singular or badly scaled. Results may be
 inaccurate.
RCOND =  1.541976e-18.

D =
```

```
   1.0e+16 *

   -0.4504    0.9007   -0.4504
    0.9007   -1.8014    0.9007
   -0.4504    0.9007   -0.4504


detA2 =

    -2


detB2 =

   6.6613e-16


A3 =

     1     2     1
     0     1     2


B3 =

     1     2     0
     1     1     2


C =

    0.3333   -0.3333
   -0.1333    0.3333
```

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