

MAT 343 Laboratory 1

```
>> diary lab1.txt  
>> % MAT 343 MATLAB Assignment # 1
```

Q1)

```
>> A=[2, 6, -4; -1, 6, -1; 1, -2, 1]
```

A =

```
     2     6    -4  
    -1     6    -1  
     1    -2     1
```

```
>> B=[-0.9, 1.5, 2.5; 3.3, 0.0, 1.3; 3.5, 2.6, -0.1]
```

B =

```
   -0.9000    1.5000    2.5000  
    3.3000         0    1.3000  
    3.5000    2.6000   -0.1000
```

```
>> C=[-5, -6, -6; 6, -1, -3]
```

C =

```
    -5    -6    -6  
     6    -1    -3
```

(i) B + A

```
>> B+A
```

ans =

```
    1.1000    7.5000   -1.5000  
    2.3000    6.0000    0.3000  
    4.5000    0.6000    0.9000
```

(ii) A+B

```
>> A+B
```

ans =

1.1000	7.5000	-1.5000
2.3000	6.0000	0.3000
4.5000	0.6000	0.9000

(iii) 3+C

>> 3+C

ans =

-2	-3	-3
9	2	0

(iv) CA

>> C*A

ans =

-10	-54	20
10	36	-26

(v) AB

>> A*B

ans =

4.0000	-7.4000	13.2000
17.2000	-4.1000	5.4000
-4.0000	4.1000	-0.2000

(vi) 3(A + B)

>> 3*(A+B)

ans =

3.3000	22.5000	-4.5000
6.9000	18.0000	0.9000
13.5000	1.8000	2.7000

(vii) 3A + 3B

```
>> (3*A)+(3*B)
```

```
ans =
```

```
    3.3000    22.5000   -4.5000  
    6.9000    18.0000    0.9000  
   13.5000     1.8000     2.7000
```

(viii) AC

```
>> A*C
```

```
Error using *
```

```
Inner matrix dimensions must agree.
```

(ix) A + C

```
>> A+C
```

```
Matrix dimensions must agree.
```

(x) BA

```
>> B*A
```

```
ans =
```

```
   -0.8000   -1.4000    4.6000  
    7.9000   17.2000  -11.9000  
    4.3000   36.8000  -16.7000
```

(a) Did MATLAB refuse to do any of the requested calculations? If so, which ones and why?

Some calculations for matrix multiplication were refused the reason being that those matrix had different dimensions.

(b) Does $A + B = B + A$?

YES

(c) Does $3(A + B) = 3A + 3B$?

YES

(d) What did $3+C$ do?

It adds 3 to all elements in the matrix C

(e) Does $AB = BA$?

No

Q2)

```
>> A=[-2, 4; -1, 2]
```

```
A =
```

```
    -2    4  
    -1    2
```

```
>> B=[-3, -6; 3, 6]
```

```
B =
```

```
    -3   -6  
     3    6
```

```
>> C=[-2, -6; 1, 3]
```

```
C =
```

```
    -2   -6  
     1    3
```

(i) $A(B + C) = BA + CA$: FALSE

```
>> A*(B+C)
```

```
ans =
```

```
    26    60  
    13    30
```

```
>> (B*A)+(C+A)
```

```
ans =
```

```
     8   -26  
   -12    29
```

```
>> (B*A)+(C*A)
```

```
ans =
```

```
22 -44
-17 34
```

(ii) $(A + B)^2 = A^2 + 2AB + B^2$: FALSE

```
>> (A+B)^2
```

ans =

```
21 -6
6 60
```

```
>> A^2+(2*A*B)+B^2
```

ans =

```
27 54
27 54
```

(iii) If $A^2 = 0$, then $A = 0$: FALSE

```
>> A^2
```

ans =

```
0 0
0 0
```

```
>> A
```

A =

```
-2 4
-1 2
```

(iv) $A(B + C) = AB + AC$: TRUE

```
>> A*(B+C)
```

ans =

```
26 60
13 30
```

```
>> (A*B)+(A*C)
```

ans =

26 60
13 30

(v) If $BC = 0$, then $B = 0$ or $C = 0$: FALSE

>> B*C

ans =

0 0
0 0

>> B

B =

-3 -6
3 6

>> C

C =

-2 -6
1 3

(vi) $(A - B)(A + B) = A^2 - B^2$: FALSE

>> (A - B)*(A + B)

ans =

15 78
12 -24

>> A^2 - B^2

ans =

9 18
-9 -18

(vii) $(AB)^2 = A^2B^2$: FALSE

```
>> (A*B)^2
```

```
ans =
```

```
    648    1296  
    324    648
```

```
>> A^2*B^2
```

```
ans =
```

```
    0    0  
    0    0
```

Q3)

```
>> A=[2, -6; 1, 4]
```

```
A =
```

```
    2   -6  
    1    4
```

```
>> B=[-5, 4; 4, -1]
```

B =

$$\begin{bmatrix} -5 & 4 \\ 4 & -1 \end{bmatrix}$$

>> C=[4, 1, 2; -5, 6, -6]

C =

$$\begin{bmatrix} 4 & 1 & 2 \\ -5 & 6 & -6 \end{bmatrix}$$

(i) $A^T B^T$

>> (A.')(B.')

ans =

$$\begin{bmatrix} -6 & 7 \\ 46 & -28 \end{bmatrix}$$

(ii) AC^T

>> A*(C.')

Error using *

Inner matrix dimensions must agree.

(iii) $(A^T)^T$

>> (A.').'

ans =

$$\begin{bmatrix} 2 & -6 \\ 1 & 4 \end{bmatrix}$$

(iv) $(AB)^T$

>> (A*B).'

ans =

$$\begin{bmatrix} -34 & 11 \\ 14 & 0 \end{bmatrix}$$

v) $C^T A$

```
>> C.'*A
```

ans =

```
    3   -44  
    8    18  
   -2   -36
```

(vi) B^T

```
>> B.'
```

ans =

```
   -5    4  
    4   -1
```

(vii) $B^T A^T$

```
>> (B.')*(A.)
```

ans =

```
  -34   11  
   14    0
```

(a) Did MATLAB refuse to do any of the requested calculations? If so, which ones and why?

YES, multiplication request was cancelled as the dimensions of the matrix didn't matched.

(b) Does $(AB)^T = A^T B^T$? Does $(AB)^T = B^T A^T$?

No; No

```
>> (A*B).'
```

ans =

```
  -34   11  
   14    0
```

```
>> (B.')*(A.)
```

ans =

```
-34 11  
14  0
```

>> (A.)*(B.)

ans =

```
-6  7  
46 -28
```

(c) Is B symmetric? Why or why not? Yes

>> B =

```
-5  4  
4  -1
```

>> B.'

ans =

```
-5  4  
4  -1
```

(d) What is the relationship between $(A^T)^T$ and A?

They are equal.

>> (A.).'

ans =

```
2  -6  
1   4
```

>>A =

```
2  -6  
1   4
```

Q4)

```
>> R=round(10*rand(3)), S=round(10*rand(3))
```

R =

```
8  9  3
9  6  5
1  1 10
```

S =

```
10 10  1
2  5  4
10  8  9
```

(i) [R*S(:,1), R*S(:,2), R*S(:,3)]

```
>> [R*S(:,1), R*S(:,2), R*S(:,3)]
```

ans =

```
128 149  71
152 160  78
112  95  95
```

(ii) [R(1,:)*S; R(2,:)*S; R(3,:)*S]

```
>> [R(1,:)*S; R(2,:)*S; R(3,:)*S ]
```

ans =

```
128 149  71
152 160  78
112  95  95
```

(iii) Compare the results of parts (i) and (ii) to the product R*S: THEY ARE EQUAL.

```
>> R*S
```

ans =

```
128 149  71
152 160  78
```

112 95 95

(iv) Explain how the matrices in (i) and (ii) are generated.

In the matrix (i) each row of matrix S is being specifically being multiplied by that of matrix R

In the case of matrix (ii) each row of matrix R is being specifically being multiplied by that of matrix S

Q5)

```
>> M=diag([6,7,8])
```

M =

```
6  0  0
0  7  0
0  0  8
```

```
>> N = 7*eye(3,3)
```

N =

```
7  0  0
0  7  0
0  0  7
```

```
>> A=
```

```
3  3  3
3  3  3
3  3  3
```

```
>> P= triu(A)
```

P =

```
3  3  3
0  3  3
0  0  3
```

```
>> Q = 9*ones(3,2)
```

Q =

```
9  9
9  9
9  9
```

6)

```
>> G=[C,A,eye(2,2);zeros(2,3),eye(2,2),B]
```

G =

```
4  1  2  2 -6  1  0
-5  6 -6  1  4  0  1
0  0  0  1  0 -5  4
0  0  0  0  1  4 -1
```

7)

a)

```
>> H = G(1:3,1:3)
```

H =

```
4  1  2
-5  6 -6
0  0  0
```

b)

```
>> E=H
```

E =

```
4  1  2
-5  6 -6
0  0  0
```

```
>> E(3,1) = -E(2,1)
```

E =

```
4  1  2
-5  6 -6
5  0  0
```

c)

```
>> H(1,:) = []
```

H =

```
-5  6 -6  
0   0  0
```

>> **F=H**

F =

```
-5  6 -6  
0   0  0
```

d)

G(:,:) , will display the entire array G

Where as **G(:)** will display the entire array in one row, in the form of one row and the next row below it making it a big column

e)

>> **G(5,1)**

Index exceeds matrix dimensions.

G(5,1): doesn't gives anything as it exceeds matrix dimensions, matrix only has 4 rows cant go to the fifth one.

f)

>> **max(G)**

ans =

```
4   6   2   2   4   4   4
```

It gives the maximum value from each column of G

>> **sum(G)**

ans =

```
-1   7  -4   4  -1   0   4
```

It gives the sum of each column of G

g)

>> **G(G>3)**

ans =

4
6
4
4
4

Gives a list of all elements in g which are greater than 3

>> G(G>3)=100

G =

```
100    1    2    2   -6    1    0
  -5  100   -6    1  100    0    1
    0    0    1    0   -5  100
    0    0    0    1    1  100   -1
```

It replaces all the elements in G which are greater than 3 by 100

8)

>> A = [4,5,3;-8,-14,-2;16,-4,38]

A =

```
4    5    3
-8  -14   -2
16   -4   38
```

>> A(1,:)=1/4*A(1,:)

A =

```
1.0000  1.2500  0.7500
-8.0000 -14.0000 -2.0000
16.0000 -4.0000 38.0000
```

>> A(2,:)=A(2,:)+ 8*A(1,:)

A =

```
1.0000  1.2500  0.7500
  0  -4.0000  4.0000
16.0000 -4.0000 38.0000
```

```
>> A(3,:)=A(3,)+ (-16)*A(1,)
```

A =

```
1.0000  1.2500  0.7500
0 -4.0000  4.0000
0 -24.0000 26.0000
```

```
>> A(2,:)=1/4*A(2,)
```

A =

```
1.0000  1.2500  0.7500
0  1.0000 -1.0000
0 -24.0000 26.0000
```

```
>> A(3,:)=A(3,)+ (24)*A(2,)
```

A =

```
1.0000  1.2500  0.7500
0  1.0000 -1.0000
0  0  2.0000
```

```
>> A(3,:)=1/2*A(3,)
```

A =

```
1.0000  1.2500  0.7500
0  1.0000 -1.0000
0  0  1.0000
```

```
>> A(2,:)=A(2,)+ (1)*A(3,)
```

A =

```
1.0000  1.2500  0.7500
0  1.0000  0
0  0  1.0000
```

```
>> A(1,:)=A(1,)+ (-3/4)*A(3,)
```

A =


```
1.0000  1.2500    0
      0  1.0000    0
      0    0  1.0000
```

```
>> A(1,:)=A(1,:)+ (-5/4)*A(2,:)
```

A =

```
1  0  0
0  1  0
0  0  1
```