MAT 343 LAB 1 - Zachary Rundstrom

Question 1

Enter the matrices A, B, C

```
A = [-1 2 -4; 2 2 3; 2 6 -3]
```

```
A = 3×3
    -1     2    -4
     2     2     3
     2     6    -3
```

```
B = [-0.4 1.3 0.8; 2.0 2.3 2.3; 1.3 2.9 1.1]
```

```
B = 3×3
   -0.4000    1.3000    0.8000
    2.0000    2.3000    2.3000
    1.3000    2.9000    1.1000
```

```
C = [-3 1; 1 5; 1 -3]
```

```
C = 3×2
    -3     1
     1     5
     1    -3
```

Perform only the operations for which MATLAB does not given an error message.

(i)

```
(5 * A) + (5 * B)
```

```
ans = 3×3
   -7.0000   16.5000  -16.0000
   20.0000   21.5000   26.5000
   16.5000   44.5000   -9.5000
```

(ii)

```
5 * (A+B)
```

```
ans = 3×3
   -7.0000   16.5000  -16.0000
   20.0000   21.5000   26.5000
   16.5000   44.5000   -9.5000
```

(iii)

```
A + B
```

```
ans = 3×3
   -1.4000    3.3000   -3.2000
    4.0000    4.3000    5.3000
    3.3000    8.9000   -1.9000
```

(iv)

```
A * C
```

```
ans = 3×2
     1    21
    -1     3
    -3    41
```

(v)

```
A * B
```

```
ans = 3×3
   -0.8000   -8.3000   -0.6000
    7.1000   15.9000    9.5000
    7.3000    7.7000   12.1000
```

(vi)

```

```

(vii)

```
B + A
```

```
ans = 3×3
   -1.4000    3.3000   -3.2000
    4.0000    4.3000    5.3000
    3.3000    8.9000   -1.9000
```

(viii)

```
2 + C
```

```
ans = 3×2
    -1     3
     3     7
     3    -1
```

(ix)

```
B * A
```

```
ans = 3×3
    4.6000    6.6000    3.1000
    7.2000   22.4000   -8.0000
    6.7000   15.0000    0.2000
```

(x)

```

```

(a)

(x) CA the dimentions of the columns of C did not match the rows of A

(vi) The dimmentions of two matrix's need to be the same when adding

(b)

No

(c)

Yes

(d)

Added 2 to each value of C

(e)

Yes

Question 2

Enter the matrices A, B, C

```
A = [6 4;-9 -6]
```

```
A = 2×2
     6     4
    -9    -6
```

```
B = [-3 -12;4 16]
```

```
B = 2×2
    -3   -12
     4    16
```

```
C = [-4 16;1 -4]
```

```
C = 2×2
    -4    16
     1    -4
```

Check whether the given rules hold.

Note: *for the rules that involve checking whether an identity holds, you can compute separately the right hand side and the left hand side and visually compare them or you can use the logical operator == to determine whether they are true or false. A==B does element by element comparison between A an dB and returns an array with elements set to 1 (True) where the relation is true and elements set to 0 (False) where it is not.*

(i)

```
ans1 = A * (B + C) == A * B + A * C
```

```
ans1 = 2×2 logical array
   1   1
   1   1
```

Comment: True

(ii)

```
ans1 = (A * B)^2 == A^2 * B^2
```

```
ans1 = 2×2 logical array
   0   0
   0   0
```

Comment: False

(iii)

```
ans1 = (A - B) * (A + B) == A^2 - B^2
```

```
ans1 = 2×2 logical array
   0   0
   0   0
```

Comment: False

(iv)

```
ans1 = (A + B)^2 == A^2 + 2 * A * B + B^2
```

```
ans1 = 2×2 logical array
   0   0
   0   0
```

Comment: False

(v)

```
ans1 = A * (B + C) == B * A + C * A
```

```
ans1 = 2×2 logical array
   0   0
   0   0
```

Comment: False

(vi)

```
False
```

Comment: False

(vii)

```
True
```

Comment: True

Question 3

Enter the matrices A, B, C

```
A = [
-6 -3;
3 -1
]
```

```
A = 2×2
    -6    -3
     3    -1
```

```
B = [
 2 -2;
-2 -1
]
```

```
B = 2×2
     2    -2
    -2    -1
```

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

```
C = 2×3
     2    -1    -2
     3    -6    -1
```

Perform only the operations for which MATLAB does not given an error message.

(i)

```

```

(ii)

```
B'
```

```
ans = 2×2
     2    -2
    -2    -1
```

(iii)

```
A' * B'
```

```
ans = 2×2
   -18     9
    -4     7
```

(iv)

```
A''
```

```
ans = 2×2
    -6    -3
     3    -1
```

(v)

```
B' * A'
```

```
ans = 2×2
    -6     8
    15    -5
```

(vi)

```
C' * A
```

```
ans = 3×2
    -3    -9
   -12     9
     9     7
```

(vii)

```
(A * B)'
```

```
ans = 2×2
    -6     8
    15    -5
```

(a)

Yes, The first (i) question would not compute due to inccorect column to rows

(b)

They are equivalent

(c)

Does (AB) T = AT BT ? No

Does (AB) T = BT AT ? Yes

(d)

Yes, the values across the diagonal are equivalent

Question 4

Enter the matrices R and S

```
R = round(10*rand(3))
```

```
R = 3×3
     7     0     8
     3     4     8
    10     4     2
```

```
S = round(10*rand(3))
```

```
S = 3×3
     5     7     7
     4     8     7
     6     3     2
```

(i)

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

```
ans = 3×3
    83    73    65
    79    77    65
    78   108   102
```

(ii)

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

```
ans = 3×3
    83    73    65
    79    77    65
    78   108   102
```

(iii)

Compute the product RS.

```
R * S
```

```
ans = 3×3
    83    73    65
    79    77    65
    78   108   102
```

How does RS compare to the answers to questions (i) and (ii)?

They are the same.

(iv)

Explanation:

(i)Each column is being multiplied by the R matrix and is being stored as the columns of the answer

(ii)Each row is being multiplied by the R matrix and is being stored as the rows of the answer

Question 5

Note: *Use `eye`, `ones`, `diag` and `triu`. Do not enter the matrices explicitely. Each matrix shold be generated with a single command.*

Create the matrix M

```
M = [9 0 0 ;
    0 10 0;
    0 0 11]
```

```
M = 3×3
     9     0     0
     0    10     0
     0     0    11
```

```

```

Create the matrix N

```
N= [8 8 8;
    0 8 8;
    0 0 8]
```

```
N = 3×3
     8     8     8
     0     8     8
     0     0     8
```

Create the matrix P

```
P = [7 0 0;
     0 7 0;
     0 0 7]
```

```
P = 3×3
     7     0     0
     0     7     0
     0     0     7
```

Create the matrix Q

```
Q = [5 5;
     5 5;
     5 5;]
```

```
Q = 3×2
     5     5
     5     5
     5     5
```

Question 6

Create the matrix G

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

```
G = 4×7
     1     0     0     0     0     2    -2
     0     1     0     0     0    -2    -1
    -6    -3     2    -1    -2     1     0
     3    -1     3    -6    -1     0     1
```

Question 7

(a)

```
H = G(1:3,4:6)
```

```
H = 3×3
     0     0     2
     0     0    -2
    -1    -2     1
```

(b)

```
E = H
```

```
E = 3×3
     0     0     2
     0     0    -2
    -1    -2     1
```

```
E(1,1) = 5
```

```
E = 3×3
     5     0     2
     0     0    -2
    -1    -2     1
```

(c)

```
F = H
```

```
F = 3×3
     0     0     2
     0     0    -2
    -1    -2     1
```

```
F = F(:,1:2)
```

```
F = 3×2
     0     0
     0     0
    -1    -2
```

(d)

Enter the given command, examine the output and then write a comment describing it.

Do not include the output in your lab report.

```
G(:,:);
```

Comment: The full matrix G is displayed

(e)

```

```

Explanation: Throws an errors saying the position is out of array bounds

(f)

```
max(G);
sum(G);
```

Explanation:

(g)

```
G(G>0) = 400
```

```
G = 4×7
   400     0     0     0     0   400    -2
     0   400     0     0     0    -2    -1
    -6    -3   400    -1    -2   400     0
   400    -1   400    -6    -1     0   400
```

What does the first command do?

Gives all values of G that are greater than 0.

What does the second command do?

Changes each value of G that is greater than 0 into 400.

Question 8

```
format rat
```

Enter the matrix A

```
A = [7 5 4 ;
   -21 -16 -10;
   21 10 27]
```

```
A =
      7             5             4
    -21           -16           -10
     21            10            27
```

Perform row operations that reduce the matrix to Row Echelon Form.

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

```
A =
      7             5             4
      0            -6            17
     21            10            27
```

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

```
A =
      7             5             4
      0            -6            17
      0            -5            15
```

```
A(3,:) = 6*A(3,:)+ -5*A(2,:)
```

```
A =
      7             5             4
      0            -6            17
      0             0             5
```

```
 A(1,:)=A(1,:)/7
```

```
A =
      1            5/7           4/7
      0            -6            17
      0             0             5
```

```
 A(2,:)=A(2,:)/-6
```

```
A =
      1            5/7           4/7
      0             1          -17/6
      0             0             5
```

```
 A(3,:)=A(3,:)/5
```

```
A =
```

```
     1             5/7            4/7
     0             1            -17/6
     0             0              1
```

```
format short
```