MAT343 LAB1

Question 1

```matlab
    A = [4,-5,4;4,0,1;5,-1,1]
    B = [0.1,1.4,-0.8;1.6,2.5,0.5;3.9,1.1,3.0]
    C = [0,0;-2,0;3,4]
% i)
    A+B
% ii)
    5*(A+B)
% iii)
    %C*A
% iv)
    %A+C
% v)
    1+C
% vi)
    A*B
% vii)
    5*A+5*B
% viii)
    B*A
% ix)
    A*C
% x)
    B*A
% a)
    % C*A and A+C were refused because the dimensions of the
 calculations
    % do not agree and is unable to compute.
% b)
    % Yes, A+B does equal B+A because in addition order does not
 matter.
% c)
    % 1+C adds one to each element in the C matrix.
% d)
    % Yes, 5*(A+B) = 5*A+5*B because it is a constant added by two
    % matricies thus order doesn't matter.
% e)
    % No, A*B does not equal B*A. Since it is multiplication order
 matters
    % in this case.


A =

        4                -5                4
        4                 0                1
        5                -1                1


B =
```

```
          1/10              7/5              -4/5
           8/5              5/2               1/2
          39/10            11/10               3


C =

            0                0
           -2                0
            3                4


ans =

          41/10            -18/5             16/5
           28/5             5/2               3/2
          89/10            1/10                4


ans =

          41/2              -18               16
           28              25/2              15/2
          89/2              1/2               20


ans =

            1                1
           -1                1
            4                5


ans =

            8               -5/2             63/10
          43/10            67/10             -1/5
          14/5             28/5              -3/2


ans =

          41/2              -18               16
           28              25/2              15/2
          89/2              1/2               20


ans =

            2               3/10               1
         189/10            -17/2             47/5
           35              -45/2            197/10
```

```
ans =

    22              16
     3               4
     5               4


ans =

     2             3/10             1
   189/10         -17/2           47/5
    35            -45/2          197/10
```

Question 2

```matlab
    A = [12,9;-16,12]
    B = [-1,-2;2,4]
    C = [-2,6;1,-3]
% i)
    %(A*B)^2 = A^2*B^2
    % False
% ii)
    % A*(B+C) = A*B+A*C
    % True
% iii)
    % If BC = 0, then B = 0 or C = 0
    % False a 0 matrix multiplied by any other matrix will always be
 0. But
    % doesn't mean that because B*C = 0, then C or C has to be a 0
 matrix.
% iv)
    % If A^2 = 0, then A = 0
    % False again like i the previous question it is true but doesnt
 mean
    % that is why. If A^2 = 0, doesnt mean A = 0. It could be numerous
 of
    % possibilities.
% v)
    %(A+B)^2 = A^2+2*A*B+B^2
    % False
% vi)
    %(A-B)*(A+B) = A^2-B^2
    % False
% vii)
    % A*(B+C) = B*A+C*A
    % False


A =

    12               9
   -16              12
```

B =

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


C =

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


Question 3

```
    A = [0,3;-6,3]
    B = [-4,2;2,5]
    C = [1,-1,0;5,-2,-3]
% i)
    B'*A'
% ii)
    C'*A
% iii)
    A'*B'
% iv)
    (A')'
% v)
    %A*C'
% vi)
    (A*B)'
% vii)
    B'
% a)
    % Yes, A*C' was refused because the dimmensions do not agree for
 matrix
    % multiplication.
% b)
    % No, (AB)' does not equal A'*B' because when you are transposing
 the
    % rows become the columns and if u multiply the matrices first
 before
    % doing that then the quantity would be different. Yes, (AB)'
 equals
    % B'*A' because you switched the rows with columns it ends up
 aligning
    % if you change the order of multiplication because you are using
 B's
    % columns and A's rows as you would in straight matrix
 multiplication.
% c)
    % B is not symmetric, B does not equal B'.
% d)
    % (A')' relationship to A is the same. It would result in the
 original
```

```
% matrix when transposing twice.
```

A =

       0   3
      -6   3

B =

      -4   2
       2   5

C =

       1   -1   0
       5   -2   -3

ans =

       6   30
      15   3

ans =

     -30   18
      12   -9
      18   -9

ans =

     -12   -30
      -6   21

ans =

       0   3
      -6   3

ans =

       6   30
      15   3

ans =

```
        -4                     2
         2                     5
```

Question 4

```matlab
    R = round(10*rand(3)), S = round(10*rand(3))
% i)
    [R*S(:,1), R*S(:,2), R*S(:,3)]
% ii)
     [R(1,:)*S; R(2,:)*S; R(3,:)*S]
% iii)
    % They all end up being the result of R*S.
% iv)
    % In the first question matrix R is being multiplied by the first
    % column of matrix S as the first row. Next row is matrix R being
    % muliplied by the second row of matrix S, and etc. In the second
    % question it is the same thing but backwards. You use the first
 column
    % of matrix R and multiply it by matrix S, and continue to the
 last
    % column of matrix R.


R =

         8                     1                    10
         8                     7                     6
         7                     5                     8


S =

         5                     1                     4
         4                     1                     8
         8                     2                     8


ans =

       124                    29                   120
       116                    27                   136
       119                    28                   132


ans =

       124                    29                   120
       116                    27                   136
       119                    28                   132
```

Question 5

```matlab
    M = 4*triu(ones(3))
```

```
N = diag([7,8,9])
P = 2*eye(3)
Q = 6*ones(3,2)
```

M =

4	*4*	*4*
0	*4*	*4*
0	*0*	*4*

N =

7	*0*	*0*
0	*8*	*0*
0	*0*	*9*

P =

2	*0*	*0*
0	*2*	*0*
0	*0*	*2*

Q =

6	*6*
6	*6*
6	*6*

Question 6

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

G =

Columns 1 through 5

0	*3*	*1*	*-1*	*0*
-6	*3*	*5*	*-2*	*-3*
1	*0*	*0*	*0*	*0*
0	*1*	*0*	*0*	*0*

Columns 6 through 7

1	*0*
0	*1*

```
          -4                    2
           2                    5
```

Question 7` a)

```
    H = G(1:3,5:7)
% b)
    E = H;
    E(2,1) = 2
% c)
    F = H(1:3,2:3)
% d)
    % If you enter G(:,:), it returns all the rows and columns of
 matrix G.
    % And G(:), returns all the rows of matrix G, as a row vector
 matrix.
% e)
    % If you enter G(5,1), it will return the index value at row 5 and
    % column 1, but in matrix G, there is no existing element, and
 will
    % return an error as it as the index is out of bounds.
% f)
    % If you enter max(G), it will return the maximum value per column
 as a
    % single column vector matrix. And sum(G) does the same but it
 will
    % take the sum on the column this time.
% g)
    % If you enter G(G>2), it will return every value greater than 2
 as a
    % row vector, and if you set G(G>2)=300, then it will return the
    % original G matrix, but in place of the values greater than 2, it
 will
    % be replaced with 300. G(G>2) is a conditonal statement so MATLAB
    % searches the rows for those values and returns the value when
 the
    % statement is true in a row vector.
```

```
H =

      0                1                0
     -3                0                1
      0               -4                2


E =

      0                1                0
      2                0                1
      0               -4                2
```

```
F =

        1               0
        0               1
       -4               2
```

Question 8

```
A = [2,2,5;-6,-9,-11;8,-1,37]
format rat
A = [(1/2)*A(1,:);A(2,:);A(3,:)]
A = [A(1,:);A(2,:)+6*A(1,:);A(3,:)]
A = [A(1,:);A(2,:);A(3,:)-8*A(1,:)]
A = [A(1,:);(-1/3)*A(2,:);A(3,:)]
A = [A(1,:);A(2,:);A(3,:)+9*A(2,:)]
A = [A(1,:);A(2,:);(1/5)*A(3,:)]
```

```
A =

        2               2               5
       -6              -9             -11
        8              -1              37


A =

        1               1             5/2
       -6              -9             -11
        8              -1              37


A =

        1               1             5/2
        0              -3               4
        8              -1              37


A =

        1               1             5/2
        0              -3               4
        0              -9              17


A =

        1               1             5/2
        0               1            -4/3
        0              -9              17
```

```
A =

     1               1               5/2
     0               1              -4/3
     0               0               5


A =

     1               1               5/2
     0               1              -4/3
     0               0               1
```

Published with MATLAB® R2018b