Contents


```
% Kathryn Atherton
% Linear Algebra (MA 26500)
% Exercises 3.1

clc
clear
```

Exercise 1

```
fprintf('Exercise 1: with the matrices from routine matdat1, compute and')
fprintf(' record the results of the following matrix expressions in the')
fprintf(' space provided. If an operation is not defined, state why.\n')

% Type A, B, C, D, and x into matlab to see MATLAB display them
A = [5, -2, 1; 1, 0, 4; -3, 7, 2];
B = [2, 2, 3; -1, 4, 1; 5, -3, 0];
C = [1, -1, 2; 0, 1, 4; -5, 3, 6];
D = [-1, 2, 3; 0, 4, 5];
x = [-2; 3; 1];

fprintf('A + B =')
A + B
fprintf('A * B =')
A * B
fprintf('D * C =')
D * C
fprintf('B - D =\n')
fprintf('This operation is not defined because the matrix dimensions do not
agree.\n')
fprintf('B * A =')
B * A
fprintf('C transposed')
C'
fprintf('C * x =')
C * x
fprintf('x transposed * x =')
x' * x
fprintf('A ^ 2 =')
A ^ 2
fprintf('6 * D =')
6 * D
fprintf('x * x =\n')
```

```
fprintf('This operation is not defined because the inner matrix dimensions do not
agree.\n')
fprintf('((A - B) * x) transposed =')
((A - B) * x)'
fprintf('A * A =')
A * A
fprintf('5 * A - 3 * B =')
5 * A - 3 * B
```

```
Exercise 1: with the matrices from routine matdat1, compute and record the results
of the following matrix expressions in the space provided. If an operation is not
defined, state why.
A + B =
ans =

     7     0     4
     0     4     5
     2     4     2

A * B =
ans =

    17    -1    13
    22   -10     3
    -3    16    -2

D * C =
ans =

   -16    12    24
   -25    19    46

B - D =
This operation is not defined because the matrix dimensions do not agree.
B * A =
ans =

     3    17    16
    -4     9    17
    22   -10    -7

C transposed
ans =

     1     0    -5
    -1     1     3
     2     4     6

C * x =
ans =
```

```
    -3
     7
    25

x transposed * x =
ans =

    14

A ^ 2 =
ans =

    20    -3    -1
    -7    26     9
   -14    20    29

6 * D =
ans =

    -6    12    18
     0    24    30

x * x =
This operation is not defined because the inner matrix dimensions do not agree.
((A - B) * x) transposed =
ans =

   -20   -13    48

A * A =
ans =

    20    -3    -1
    -7    26     9
   -14    20    29

5 * A - 3 * B =
ans =

    19   -16    -4
     8   -12    17
   -30    44    10
```

Exercise 2

Enter each of the following matrices into MATLAB. Exercise 2 refers tho these matrices.

```
A = [1, 3; 2, 4; 3, 1];
```

```
B = [-1, 2; 4, -2; 7, -1];
C = [1, 5; -5, 3];
D = [4, 3, -2; 1, 0, 5; 2, -1, 6];


fprintf('Exercise 2: Perform the following matrix algebra computations in ')
fprintf('MATLAB. Record your result below the expression.\n')

fprintf('Part A: A + B')
A + B
fprintf('Part B: B + C\n')
fprintf('This computation is not defined, as the matrix dimensions do not agree.\n')
fprintf('Part C: D * A')
D * A
fprintf('Part D: 2 * A - 3 * B')
2 * A - 3 * B
fprintf('Part E: A transposed')
A'
fprintf('Part F: C ^ 2')
C ^ 2
```

```
Exercise 2: Perform the following matrix algebra computations in MATLAB. Record
your result below the expression.
Part A: A + B
ans =

     0     5
     6     2
    10     0

Part B: B + C
This computation is not defined, as the matrix dimensions do not agree.
Part C: D * A
ans =

     4    22
    16     8
    18     8

Part D: 2 * A - 3 * B
ans =

     5     0
    -8    14
   -15     5

Part E: A transposed
ans =

     1     2     3
```

```
     3     4     1
```

```
Part F: C ^ 2
ans =

   -24    20
   -20   -16
```

Exercise 5

```
fprintf('Let A and X be the matrices defined below.')
A = [6, -1, 1; 0, 13, -16; 0, 8, -11]
X = [10.5; 21.0; 10.5]

fprintf('Part A: Determine a scalar r such that AX = rX.\n')
fprintf('A * X =')
A * X
r = 5
fprintf('r * X =')
r * X

fprintf('Part B: Compute AX - rX for the value of r from Part A.')
A * X - r * X
fprintf('Part C: Is it true that A (transposed) * X = rX for the value of r
determined in part A?\n')
fprintf('A transposed * X')
A' * X
fprintf('r * X')
r * X
fprintf('No, it is not true that A transposed * X = rX for the value of r
determined in part A.\n')
```

```
Let A and X be the matrices defined below.
A =

     6    -1     1
     0    13   -16
     0     8   -11


X =

   10.5000
   21.0000
   10.5000

Part A: Determine a scalar r such that AX = rX.
A * X =
```

```
ans =

   52.5000
  105.0000
   52.5000


r =

     5

r * X =
ans =

   52.5000
  105.0000
   52.5000

Part B: Compute AX - rX for the value of r from Part A.
ans =

     0
     0
     0

Part C: Is it true that A (transposed) * X = rX for the value of r determined in
part A?
A transposed * X
ans =

   63.0000
  346.5000
 -441.0000

r * X
ans =

   52.5000
  105.0000
   52.5000

No, it is not true that A transposed * X = rX for the value of r determined in part
A.
```

Published with MATLAB® R2015a