Group 5:

Tikhon Riazantsev, Agastya Heryudhanto.

Exercise sheet 1

Submission deadline: November 3, 10:00 a.m.

Task 1: Matlab Introduction (10 points)

Prepare a MATLAB script called *myIntroduction* and perform the following tasks:

a) Create the vectors $a, b \in \mathbb{R}^{1\times 5}$ with uniformly distributed random numbers.

b) Multiply the vectors a and b to get $c \in \mathbb{R}$ and $A \in \mathbb{R}^{5\times 5}$. Transpose the vectors if necessary.

c) Perform element-wise multiplication with a and b to get vector $e \in \mathbb{R}^{1\times 5}$.

d) Extract the elements at locations (1,2) and (2,3) from A

e) Extract and concatenate the elements in the upper and lower rows from A.

f) Set every value < 0.5 in A to 0 using logical indexing.

g) Create a matrix $B \in \mathbb{R}^{3\times 3}$ using *magic()*.

h) Solve $Bx = f$ with $f = (1, 2, 3)^T$

i) Compute the eigenvalues of B

a)

```
a = rand(1,5);
b = rand(1,5);
disp(a);
```

```
    0.4505    0.0838    0.2290    0.9133    0.1524
```

```
disp(b);
```

```
    0.8258    0.5383    0.9961    0.0782    0.4427
```

b)

```
c = a*b';
A = a'*b;
disp(c);
```

```
    0.7841
```

```
disp(A);
```

```
    0.3721    0.2425    0.4488    0.0352    0.1994
    0.0692    0.0451    0.0835    0.0066    0.0371
    0.1891    0.1233    0.2281    0.0179    0.1014
    0.7542    0.4917    0.9098    0.0714    0.4043
    0.1258    0.0820    0.1518    0.0119    0.0675
```

c)

```
e = a.*b;
disp(e);
```

```
    0.3721    0.0451    0.2281    0.0714    0.0675
```

d)

```
disp(A(1,2));
```

```
    0.2425
```

```
disp(A(2,3));
```

```
    0.0835
```

e)

```
disp(sum(A(1,:)));
```

```
    1.2981
```

```
disp(sum(A(3,:)));
```

```
    0.6597
```

f)

```
disp(A.*(A<0.5));
```

```
    0.3721    0.2425    0.4488    0.0352    0.1994
    0.0692    0.0451    0.0835    0.0066    0.0371
    0.1891    0.1233    0.2281    0.0179    0.1014
         0    0.4917         0    0.0714    0.4043
    0.1258    0.0820    0.1518    0.0119    0.0675
```

g)

```
B = magic(3);
disp(B);
```

```
     8     1     6
     3     5     7
     4     9     2
```

h)

```
f = [1 2 3]';
solution = linsolve(B,f);
disp(solution);
```

```
    0.0500
    0.3000
    0.0500
```

i)

```
eigvalues_B = eig(B);
fprintf("%s %s %s",eigvalues_B(1), eigvalues_B(2),...
    eigvalues_B(3));
```

```
1.500000e+01 4.898979e+00 -4.898979e+00
```