Lab 0
(No submission)

MATLAB is a common and very powerful tool in science and engineering. The following link contains instruction on how to download and install MATLAB on your computer `https://is.oregonstate.edu/service/software/matlab` Let us start with some simple commands.

1. Start Matlab
2. Enter the following commands one by one

   ```
   1+2
   x=1+2
   x
   x;
   y=x^2+2*x+1/x;
   y
   ```

   What do you think the semicolon is used for?
3. To enter a row vector, simply type e.g.

   ```
   A = [1 2 -1 3]
   ```

   or

   ```
   A = [1,2,-1,3]
   ```

   To enter a column vector, use semicolon instead of space or comma

   ```
   B = [1;2;-1;3]
   ```

   Now try

   ```
   A(1)
   B(3)
   ```

   What do you get? You can see that the starting index of entries is 1 (not 0).
4. Try the following commands

   ```
   C = [1 2 3;4 5 6;7 8 9;10 11 12]
   size(C)
   transpose(C)
   C(1,:)
   C(:,2)
   C(2,:) = C(2,:) - 4*C(1,:)
   ```

   What does each command do?
5. Try the following commands

```
x = 3:15
y = 3:2:15
z = 15:-3:3
length(y)
size(x)
```

What does each command do?

6. The following commands create special matrices.

```
ones(3)
zeros(2,5)
eye(4)
eye(2,4)
eye(4,2)
```

7. Let us discuss how to plot the graph of function $y = x^2 + 2x - 3$ on the interval $[-4, 2]$. First, we discretize the interval $[-4, 2]$ by sample points, say

```
h = 1
x = -4:h:2
```

After this command, we see that x is a row vector of sample points with spacing $h = 1$. We want to compute y at each point. This is done by the command

```
y = x.^2 + 2*x - 3
```

Note that the dot in x.^2 is to tell Matlab that we want to square each entry of x. In other words, we want to square component by component. Without the dot, Matlab will interpret x^2 as x*x (multiplying row x by itself), which does not make sense. Now y is a row vector of the same length as x. Each point $(x(1), y(1))$, $(x(2), y(2))$,... belongs to the graph. A rough rendition of the graph is obtained by connecting these points by straight line segments. This is done by the command

```
plot(x,y)
```

To get a more exact graph, one should decrease the spacing size, for example choose $h = 0.1$. You can use arrow keys (Up or Down) to recall and edit previous commands.

```
h = 0.1
x = -4:h:2
y = x.^2 + 2*x - 3
plot(x,y)
```

8. Now try

```
x
y
clear x y
x
y
```

What does the command "clear" do? To erase the command window, type

```
clc
```