

# First Lab Assignment (Due by 12pm on Oct. 4)

Reference MATLAB tutorial and MATLAB lab 1, 2 and 3 demonstrations.

## Lab assignments

**Assignment 1** Please complete following sequence of problems in MATLAB:

- create a matrix  $A$  with 5 rows and 3 columns, filled with random variables between 0 and 10
- create an identity matrix  $B$  with the size of 3 times 3
- get the submatrix  $C$  of  $A$  by extracting the elements of the last three rows
- perform element-wise multiplication between matrix  $B$  and matrix  $C$ . The result is denoted as the matrix  $D$
- concatenate  $A$  and  $D$  to form matrix  $E$ , whose first 5 rows are from  $A$  and the last 3 rows are from  $D$
- plot a histogram of each column of matrix  $E$ , what can you tell about the distribution of values in columns? (Please label the axes and add a title. You should also specify other properties such as the line width, the font size and the color. Please save the figure as .png)
- write a **function** to calculate intersection between two sets  $A = 1 : 5 : 200$  and  $B = 1 : 3 : 190$ .

Please submit both of your MATLAB codes and the plotted figure.

**Assignment 2** Three birthday problem (ref. link to the three birthday problem discussion): Hint, it is the well known two birthday problem, however, the probability of  $P(B_n)$  should be probability of no three coincident birthdays for  $n = 1, 2, \dots, 100$ .

You should:

- implement a **function** (e.g., `threeBirthdaysProblem(n)`) in Matlab to compute the probability of no coincident birthdays in a group of  $n$  arbitrarily chosen people. This function takes one input argument,  $n$  and return the computed probability
- plot the figure of  $P(B_n)$  for  $n = 1, 2, \dots, 100$  similar to the one demonstrated in the lab 3. In order to plot the probabilities you have to call the defined function (e.g., `threeBirthdaysProblem`) to compute the probability for different values of  $n$ .

Please submit both of your MATLAB codes and the plotted figure.