Basic MATLAB Exercises

1. What are the commands for each of the following operations:

I. Create a row vector ‘x’ of 6 equally spaced elements between 2 and 3
II. Add 2 to the second element
III. Create a second row vector ‘y’ of some dimension with elements equal to the successive integers starting with 4
IV. Create the matrix ‘a’, whose first row is equal to ‘x’, whose second row is a line of ones, and whose third row is equal to ‘y’
V. Define a row vector ‘z’, whose elements are equal to the mean value of the columns of ‘a’
VI. Define a column vector ‘zz’, whose elements are the sum of the elements in each rows of ‘a’

2. Given a vector t = [0: .1: 1] write down the MATLAB command that will compute:

I. $\log(1 + \sqrt{t})$
II. e^{t+t^2}
III. $\cos^{-1}(t)$(inverse cosine function)
IV. $\sqrt{1+\log(t)\cdot^2}$
V. $\tan^2(t) - 1$

3. Given x = [7 6 1 2 0 -1 4 3 -2 0] what are the commands that will execute the following operations:

I. Sets the negative values of ‘x’ to zero
II. Extract the values of ‘x’ greater than 3 in a vector ‘y’
III. Add 3 to the values of ‘x’ that are even
IV. Set the values of ‘x’ that are less than the mean to zero
V. Set the values of ‘x’ that are greater than the mean to their difference with the mean

4. Create a square matrix ‘U’ of size x = 100, with random elements between -1 and 1. Compute the mean value of all the elements of ‘U’. Repeat the operation several times; you should find that the mean value is close to zero.

5. Given the following array ‘U = [0 2 4]’, ‘M = [-1 3 4]’, ‘D = [0 7; -3 6; -2 7]’ and ‘T = [8 4 6; 2 8 -3], determine for each command whether it can execute correctly; in the case it doesn’t explain why; in the case it does, predict the size of the result.

I. U + M
II. U + M.’
III. U × M
IV. D × M
V. D’ × U

6. Create two matrices U and M:

$$U = \begin{pmatrix} 2 & 4 \\ 4 & -2 \end{pmatrix}, \text{ and } M = \begin{pmatrix} 6 & -4 \\ -3 & 6 \end{pmatrix}$$

I. Compute ‘D = U + M’
II. Compute the matrix products ‘E = UM’ and ‘F = MU’
III. Are ‘U’ and ‘M’ singular? If no, compute their inverse
IV. In ‘U’, subtract to the second row, the first row multiplied by 4