MATLAB Assignment 1

Spring 2018, Section B

This homework is designed to teach you to think in terms of matrices and vectors, because this is how MATLAB organizes its data. You will find that complicated operations can be resolved by one to two lines of code if you use the correct function and store data in the appropriate form. The other purpose of this homework is to make you feel comfortable with using ***help*** function. Homework should due on ———to guybaryosef@gmail.com.

1. Creating Scalar Variables Create the following variables. Each construction should be done in **one** line. Make sure to use the assigned variable names.

(a) $a = \frac{5.7\pi}{6.9}$

(b) $b = 239 + e^5 - 2.5 \times 10^{23}$

(c) $c = ln(4.23) \times sin^{-1}(0.7)$

(d) $z = (3 + 2j) \times (4 + 5j)$

2. Complex Operations Find the real part, imaginary part, magnitude, phase and complex conjugate of z calculated in question 1e.

3. Vector and Matrix Variables Create the following variables. Make sure to use the assigned variable names. When doing part c and d, make sure you know when to use the colon operator :, and when to use ***linspace***.

(a) Create a row vector where $aVec = \begin{bmatrix} 3.14 & 15 & 9 & 26 + 0.1j \end{bmatrix}$, and generate matrices $A1$ and $A2$ with ***repmat*** and concatenation respectively, where

$$A1 = A2 = \begin{bmatrix} 3.14 & 15 & 9 & 26 + 0.1j \\ 3.14 & 15 & 9 & 26 + 0.1j \\ 3.14 & 15 & 9 & 26 + 0.1j \end{bmatrix}$$

(b) Create the column version of $aVec$, with both matrix constructor operation [ ] and ***transpose*** function in MATLAB. Name the variables $bVec1$ and $bVec2$ respectively.

(c) Create a row Vector $cVec$ where the numbers ranges from -5 to 5 in increasing order and at an interval of 0.1 between consecutive numbers.

(d) Create a column vector $dVec$ where there are 100 evenly spaced points between -5 and 5. Do not use the same operator in part c. **Optional** : Can you do it in one line?

(e) Create a matrix B where $B = \begin{bmatrix} 1 + 2j & 10^{-5} \\ e^{j2\pi} & 3 + 4j \end{bmatrix}$

(f) Use ***eye*** to ATTEMPT to create a $1,000,000 \times 1,000,000$ identity matrix.

(g) Use ***speye*** to create a $1,000,000 \times 1,000,000$ sparse identity matrix. (Suppress the output with a semicolon)

4. Vector and Matrix Operations Using the variables made in question 3, perform the following operations:

(a) Use ***magic*** and divide by 65 to create a 5×5 doubly stochastic matrix A.

(b) Create a 5×5 matrix, B, such that each element is drawn from standard normal distribution. (Note: You'll need to look up how to make it).

(c) Compute $C = BA$.

(d) Compute $D = BA$, but different from part c, perform element wise multiplication.

(e) Compute $F = \frac{1}{4}A^3 + \frac{1}{4}A^2 + \frac{1}{3}A + \frac{1}{6}I$.

(f) Compute $G = A^{-1}$.