Homework M3:
Matlab Primer [1]
Chapters 1 and 2

1. List the output you would get from the following Matlab® commands:
   a) `>> B = zeros(4);`   b) `>> B = rand(1,3);`   c) `>> B = ones(5,2);`
      `>> size(B)`   `>> length(B)`   `>> length(size(B))`

2. If $a = 2$, find the value of the following
   a)   `a(ones(3,4))`   b) `ones(a)`   c) `zeros(3,a)`

3. Which of the following Matlab® commands produces valid output (without an error message)? If the output is valid, write what it is.
   a) `>> M = [eye(2); zeros(1,2)]`   b) `>> M = [zeros(1), zeros(1,1); ones(2)]`
   c) `>> M = [zeros(2,1); eye(2,1)]`   d) `>> M = [zeros(2), ones(2,3)]`

4. Given $t = 0 : 0.1 : 2*pi$, list the exact code you would enter at the command prompt in Matlab® to compute the following functions for all values of t using only one command:

   a) $\sqrt{5t}$ b) $e^{-1/t}$ c) $\dfrac{3 + \ln(4t)}{7*(3 + |\tan(3t) - 2|)}$

   where $\ln = \log_e$ and $|x|$ is absolute value

5. Given $t = 0 : 0.001 : 0.1$, list the exact code you would enter at the command prompt in Matlab® to compute the following function for all values of t using only one command:

   $$5e^{-t/0.01}\cos(2\pi \cdot 100t) - 5e^{-t/0.01}\sin(2\pi \cdot 100t) + 10$$

For the problems 6 through 8 and 10, use the following definition of matrix A:
>> A = magic(3)

ans =

$$\begin{array}{ccc} 8 & 1 & 6 \\ 3 & 5 & 7 \\ 4 & 9 & 2 \end{array}$$

6. Find the results of executing the following Matlab® commands:
   a) `>> min(A(1:2,2:3))'`   b) `>> sort(A')`   c) `>> sum([sum(A(1:2,:));sum(A')])`

7. Find the results of executing the following Matlab® commands:
   a) `>> find(A<=3)`   b) `>> A>2`   c) `>> A(A>2)`   d) `>> A((A>2)+1)`

8. Answer the following questions and explain your answers.
   a) What property of A causes the equation $A(A') = A(A)'$ to be valid?
   b) What is the value of $A(A(2,1))$?
   c) What is the value of $A(A(2,1),A(2,1))$?
   d) What is the value of A after the following command: `>> A(min(A)) = []`

9. Write a display command to output the following message:
    Matlabs' transpose symbol is ' (Hermitian transpose)

10. Write down Matlab® commands to build a string with the following contents:
    a) A(1,:) =
    b) Left square bracket
    c) The values in A(1,:) separated by commas
    d) Right bracket
    Note: do Not figure out what A(1,:) is and use those numbers. Instead, have Matlab®
        convert the values in A(1,:) into strings using str2num( ).

REF: [1]   The Mathworks, Inc, *Matlab® Primer,* Natick, MA: The Mathworks, Inc, 2012.

Selected answers: