CHAPMAN University

Department of Computational and Data Sciences
CS501 Introductory Computation for Scientists
Fall 2019
Homework#5

Date Given: Sep 18, 2019 Due Date: Sep 24, 2019

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There are 6 problems in this homework assignment. Write a program in Python to solve these problems.

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The following problems have been taken from a book on MATLAB. Replace the word MATLAB with Python in these problems.

5. Type this matrix in MATLAB and use MATLAB to carry out the following instructions.

$$\mathbf{A} = \begin{bmatrix} 3 & 7 & -4 & 12 \\ -5 & 9 & 10 & 2 \\ 6 & 13 & 8 & 11 \\ 15 & 5 & 4 & 1 \end{bmatrix}$$

a. Create a vector **v** consisting of the elements in the second column of **A**.
b. Create a vector **w** consisting of the elements in the second row of **A**.

6. Type this matrix in MATLAB and use MATLAB to carry out the following instructions.

$$\mathbf{A} = \begin{bmatrix} 3 & 7 & -4 & 12 \\ -5 & 9 & 10 & 2 \\ 6 & 13 & 8 & 11 \\ 15 & 5 & 4 & 1 \end{bmatrix}$$

a. Create a 4×3 array **B** consisting of all elements in the second through fourth columns of **A**.
b. Create a 3×4 array **C** consisting of all elements in the second through fourth rows of **A**.
c. Create a 2×3 array **D** consisting of all elements in the first two rows and the last three columns of **A**.

7.* Compute the length and absolute value of the following vectors:

a. $\mathbf{x} = [2, 4, 7]$
b. $\mathbf{y} = [2, -4, 7]$
c. $\mathbf{z} = [5 + 3i, -3 + 4i, 2 - 7i]$

8. Given the matrix

$$\mathbf{A} = \begin{bmatrix} 3 & 7 & -4 & 12 \\ -3 & 9 & 10 & 2 \\ 6 & 13 & 8 & 11 \\ 15 & 5 & 4 & 1 \end{bmatrix}$$

a. Find the maximum and minimum values in each column.
b. Find the maximum and minimum values in each row.

9. Given the matrix

$$\mathbf{A} = \begin{bmatrix} 3 & 7 & -4 & 12 \\ -5 & 9 & 10 & 2 \\ 6 & 13 & 8 & 11 \\ 15 & 5 & 4 & 1 \end{bmatrix}$$

a. Sort each column and store the result in an array **B**.
b. Sort each row and store the result in an array **C**.
c. Add each column and store the result in an array **D**.
d. Add each row and store the result in an array **E**.

10. Consider the following arrays.

$$\mathbf{A} = \begin{bmatrix} 1 & 4 & 2 \\ 2 & 4 & 100 \\ 7 & 9 & 7 \\ 3 & \pi & 42 \end{bmatrix} \qquad \mathbf{B} = \ln(\mathbf{A})$$

Write MATLAB expressions to do the following.

a. Select just the second row of **B**.
b. Evaluate the sum of the second row of **B**.
c. Multiply the second column of **B** and the first column of **A** element by element.
d. Evaluate the maximum value in the vector resulting from element-by-element multiplication of the second column of **B** with the first column of **A**.
e. Use element-by-element division to divide the first row of **A** by the first three elements of the third column of **B**. Evaluate the sum of the elements of the resulting vector.