HW 10

ENED 1090: MODELS I
Week 10 Homework

Submit Week 11 during Lab

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INSTRUCTIONS

Complete each question below by typing your answer or copying from the output in MATLAB or Excel.

This assignment is to be completed outside of class. You will submit a digital copy to your TA during the lab session next week.

!!! **To receive points for this assignment, add your name to the filename. For example, if my name is Lin Yali, I will change the filename to**

Wk10_ened1090_homework_LinYali.doc

OBJECTIVES

For this assignment, students will demonstrate

- Arrays (scalars, vectors, tensors)

PROBLEM 1 (SEE SLIDE 8)

Define each term below.

Array	A block of related data elements, each of which is usually identified by one or more subscripts.
Scalar	A single number, or a 1-by-1 array.
Vector	One-Dimensional Arrays.
Matrix (or Tensor)	Two-Dimensional Arrays.

PROBLEM 2 (SEE SLIDE 12)

In MATLAB, it is possible to do a special divide (\) with can be very useful for Linear Algebra problems.

- Type these four commands into MATLAB.
- Then, based on commands (a) and (c),
  - describe what you think MATLAB is doing in commands (b) and (d)

```
a) 3 / 5
b) 5 \ 3
c) [1 2 3 4 5] / 2
d) 2 \ [1 2 3 4 5]
```

In commands(b): Calculate 3 divided by 5(the same thing as commands a).
In commands(d): Calculate [1 2 3 4 5] divided by 2(the same thing as commands c).

PROBLEM 3 (SEE SLIDE 27)

For MATLAB: How do you turn a column vector into a row vector (or a row vector into a column vector)?
How do you switch the rows and column in a matrix?

Question1:
We can use a transpose ' to turn a column vector into a row vector (for example :y = [5 ; 2.9 ; 3]'),
or a row vector into a column vector (For example :y = [5 2.9 3]').
Question2:
We can use ; to switch the row elements and column elements.
For example: 2 x 3 matrix (2 rows and 3 columns) A = [2.3 4.5 -7.5; 3.2 -5.1 10].

PROBLEM 4 (SEE SLIDE 30)

- Describe the five ways to create a column vector in MATLAB.
- Include an example of each
- Copy the output of the example from MATLAB

Incremental

Describe: Each element is spaced: min value : increase : max value.
Example: x = 0:1:10.
Output:
x =

0 1 2 3 4 5 6 7 8 9 10

Equally Spaced

Describe: Spacing is calculated so that min value, max value, # of elements.
Example: x = linspace(0,10,10)
Output:
x =

0 1.1111 2.2222 3.3333 4.4444 5.5556 6.6667 7.7778 8.8889 10.0000

Log-Scale Spaced

Describe: Spacing is calculated so that 10min value, 10max value, # of elements.
Example: x = logspace(0, 3, 10)
Output:
x =

1.0e+03 *

0.0010 0.0022 0.0046 0.0100 0.0215 0.0464 0.1000 0.2154 0.4642 1.0000

All zeros
(can also be applied to tensors)

Describe: All values are zero.
Example: x = zeros(3,3)
Output:
x =

0 0 0
0 0 0
0 0 0

All ones
(can also be applied to tensors)

Describe: All values are one.
Example: x = ones(5,2)
Output:
x =

1 1
1 1
1 1
1 1
1 1

PROBLEM 5

In MATLAB, try the commands shown in the table

- Do not copy the result
- Explain what the operation does
- If MATLAB says there is an error, just type **ERROR** in the space

COMMAND	EXPLAIN WHAT THE OPERATION DOES
`x = [5 -3 7 -10]`	Create a row vector with four elements:5,-3,7,-10.
`y = [1; 3; -17]`	Create a column vector with three elements:1,3,-17.
`t = 0:0.1:2`	Create a incremental vector: min value: increase : max value=0:0.1:2.
`z = linspace(0,2,11)`	Create a equally spaced vector: min value=1,max value=0.2, including eleven elements.
`q = [1 -2 3 9]; q^3`	ERROR.
`q = [1 -2 3 9]; q.^3`	Calculate the three power of each element.
`a = [ 1 2 3]; b = [4 5 6]; a*b`	Wrong use * The dimension used for matrix multiplication is incorrect. Please check and ensure that the number of columns in the first matrix matches the number of rows in the second matrix. To execute multiplication by element, use '.*'.
`a = [ 1 2 3]; b = [4 5 6]; a.*b`	Calculate the multiplication of the corresponding elements in the two arrays and the result is a new row vector whose new elements are exactly the results.
`a = [ 1 2 3]; b = [4 5 6]; a*b'`	Calculate 1*4+2*5+3*6 and the result is a number.
`a = [ 1 2 3]; b = [4 5 6]; a'*b`	The elements in a are multiplied by elements in b and the result is a 3*3 matrix whose new elements are exactly the results.
`a = [ 1 2 3]; b = [4 5 6 7]; a.*b`	ERROR.

PROBLEM 6

In MATLAB, type in the following command. Then try the commands shown in the table.

- Do not copy the result
- Explain what appears in the command window
- If MATLAB says there is an error, just type ERROR in the space

First type:

```
array = -1:0.4:1.4
```

COMMAND	EXPLAIN WHAT APPEARS IN THE COMMAND WINDOW
`array`	Display a row vector using the elements of the array we have created.
`array(1)`	Display the starting number.
`array(4)`	Display the forth element of the vector.
`array(10)`	ERROR.
`length(array)`	Display the number of the columns.
`size(array)`	Display the number of the row and the columns.
`array(2) = 42`	Change the second element of the array into 42.
`array(4:6) = 73`	Change the forth to sixth elements of the array into 73.