ELNG 204: Introduction to MATLAB
PRACTICE TEST

Index Number: UE20016516 Programme: C.E DATE: 25th April, 2018

40 minutes – 20 pts

Answer all questions

1. Consider the following equation:

$$F = G\frac{m_1 m_2}{r^2}$$

Where G is a constant equal to 6.673×10^{-11}, and m_1, m_2, and r are all arrays of size n by 1. Choose the answer to the following questions about writing this equation in MatLab.

a) What is the correct way to calculate the array F?

```
A. F = G*m1*m2/r^2
B. F = G*m1.*m2/r*r
C. F = G*m1.*m2./r^2
D. F = G*m1.*m2./r.^2
E. F = G*(m1.*m2)./r.*r
```

b) Now assume that F is calculated in the command window. What is true about the dimensions (size) of F?

```
A. F will be a column vector
B. F will be a row array
C. F will be a scalar value
D. F will be a square matrix
E. Not enough information to tell
```

c) Assuming that G, m_1, m_2, and r are scalar numbers, then class of F is:

A. char B. string C. double D. struct E. cell

d) If G, m_1, m_2, and r are now only scalar numbers, then the following code will correctly calculate the value of F:

```
>> F = G*m1*m2/r^2
```

A. True B. False

2. For the following multiple choice or TRUE / FALSE Questions, please clearly circle or underline your answer to each question. If you are uncertain or unable to circle only 1 answer, please justify yourself in words beneath the question in a blank space.

a) A function's workspace shares the same workspace as the command window

a. True b. False

b) Which of the following statements on mfiles and MatLab functions are true?

i. mfiles have no input or output variables
ii. functions must have input or output variables
iii. functions can be called within another function, whereas mfiles cannot
iv. mfiles use the command window's workspace

A. i only B. ii and iii C. i, ii, iv D. i, iv E. iv only

c) Given an m x n array of numbers, it is possible to access any set of sub-matrices, horizontal, or vertical arrays using a single line of matlab.

a. True b. False

d) Given a random real number X, the absolute value of the difference between `floor(X)` and `ceil(X)` must be 1.

a. True b. False

e) It is possible for a function to call itself within the body of its code.

a. True b. False

3. The following MATLAB commands are saved in a script file called *Question3a.m* and *Question3b.m*. What is the value of x when the script file *Question3a.m* is executed? What is the value of n and counter when *Question3b.m* is executed? Do not worry about the exact format of the output.

Script file *Question3a.m*

```
x = 0;

for i = 1:1000
      for j = 1:2000
            if i == j
                  x = x + 1;
            end
      end
end
```

x = 1000

Script file *Question3b.m*

```
n = 256;
counter = 1;

while n ~= 1
      if rem(counter,2) == 0
            n = n/2;
      else
            n = n/4;
      end
      counter = counter + 1
end
```

n = 1

counter = 6

4. Consider the following arrays defined in MatLab's workspace:

For A =

1	0	0	0
2	3	0	0
4	5	6	0
7	8	9	1

and Z =

2	9	0
7	5	6

Retrieve the following sub-matrices from W and Z in a single line of MATLAB code:

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a) Retrieve or create from W the following sub-arrays:

$\begin{bmatrix} 2 & 7 \\ 0 & 9 \end{bmatrix}$ >> [W(2,1) W(4,1); W(1,2) W(4,3)]

[1 1] >> [W(1,1) W(4,4)]

b) Retrieve or create from Z the following sub-arrays:

[6 0 5 9 7 2] >> ~~Z~~[(2,3) (1,3) (1,2) (2,1) (1,1)]

c) Retrieve or create from W and Z the following sub-arrays:

$\begin{bmatrix} 9 & 0 & 2 & 2 \\ 5 & 6 & 4 & 5 \end{bmatrix}$ >> [W(4,2) Z(1,3) Z(1,1) W(2,1);
W(3,2) W(3,3) W(3,1) Z(2,3)

5. Find the mistake in the following commands and correct them.

Mistake	Correction
`>> P =linespace(2,3)`	P = linspace(2,3)
`>> P[ 1, 2] = 4`	P(1,2) = 4
`>> K= ones(1;3)`	~~K = (~~ K = ones(1,3)

QUESTION	MARK	OUT OF
1	3	4
2	1+1	5
3	3	3
4	2	3
5	3	3
Attendance	2	2
Total	14+1	**20**
	15	