ROSE-HULMAN INSTITUTE OF TECHNOLOGY

Department of Mechanical Engineering

ME123 Computer Applications I

EXAM 1 – WRITTEN PORTION

NAME _____

SECTION NUMBER _____

CAMPUS MAILBOX NUMBER _____

EMAIL ADDRESS _____@rose-hulman.edu

Multiple Choice	/40
Coding Problem	/60
Total	/100

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ALL OF THESE PROBLEMS HAVE EQUAL WEIGHT

USE MATLAB SYNTAX FOR ALL PROGRAMS AND COMMANDS YOU WRITE

Problem 1:
Write a short program using a **`for…end`** loop to find the sum of the squares of the numbers from 5 to 10. Assign the answer to a variable called **`total`**. You do not need to print the answers with fprintf.

Problem 2:
Write a short program using a **`for…end`** loop to find the square roots of the numbers 0, 10, 20…200. You do not need to print the answers with fprintf.

Problem 3:
Write a short program using a **`for…end`** loop to put the angles 0, 10, 20…90 into an array called `'angle_array'`. The array should have 10 rows and 1 column. You do not need to print the answers with fprintf.

Problem 4:
Circle ALL of the file names that would be appropriate to use in Matlab. Appropriate files names will run and not result in errors.

a) Lab 1 task 2.m
b) 1sttaskforlab1.m
c) plot.m
d) MyName_4.m
e) plot_lab1.m
f) lecture-2-ex-3.m

Problem 5:
In MATLAB, an array *A* has been defined as follows:

$$A = \begin{bmatrix} 1 & 3 & 5 \\ 9 & 11 & 13 \\ 2 & 4 & 6 \end{bmatrix}$$

For the MATLAB command **`y = A(3,1)`** , what does MATLAB output for *y*?

Problem 6:
Using the same matrix *A* from problem 5, we now execute the following MATLAB commands:

```
B = A';
z = B(2,3)
```

What does MATLAB output for *z*?

Problem 7:
For the following mathematical expression, write the MATLAB code for *y*. Use the MATLAB command for π and not 3.14159.

$$y = (x + \pi)^2$$

Problem 8:
When we run the MATLAB program shown below, an error statement appears in the Command window.

Here's the program:

```
% exampleProgram.m
%
% This program produces an mx1 array of angles named
% degrees and an mx1 array of the sines of the angles
% named sineAngle.

for angle = 0 : pi/10 : 2*pi
    degrees(row,1)   = angle*180/pi;
    sineAngle(row,1) = sin(angle);
    row = row + 1;
end

% last line
```

Here's the error statement:

```
??? Undefined function or variable 'row'.

Error in ==> exampleProgram at 8
    degrees(row,1)   = angle*180/pi;
```

Modify the program to correct the error.

Problem 9:

Consider the following piece of code:

```
fred = 1;
for index = 1:3:8
    fred = fred*index;
end
fred
```

What result will MATLAB produce in the Command window? (Circle one.)

a) `fred = 1`
b) `fred = 7`
c) `fred = 21`
d) `fred = 28`
e) `fred = 280`
f) `Other: _____`

Problem 10:

Consider the following piece of code:

```
index = 0;
for count = 3:-1:1
    index = index + 1;
    A(1,index) = count;
end
A
```

What is *A* after the code is executed? (Circle one.)

a) `A =` $[1 \quad 2 \quad 3]$

b) `A =` $[3 \quad 2 \quad 1]$

c) `A =` $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$

d) `A =` $\begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}$

e) `A =` $[6]$

f) `Other: _____`

EXAM 1 – COMPUTER PORTION

Put all of your code in one m-file and name it: `lastname_firstname.m` (all lower case).

Include your name, section number, and CM number in the header section of your code. There should be no output other than what is asked for.

Problem (60 pts)

Download the Excel spreadsheet named "`rate.xls`" from the course web page at `http://www.rose-hulman.edu/ME123/courseware.shtml`. The file contains one column of annual investment rates (as percentages) for the years 1993 through 2007 (15 years total).

Write a MATLAB code to:

a) Read in the rate data stored in the Excel spreadsheet. Print the year and the rate for that year to a text file `lastname_firstname1.txt`, where `lastname` and `firstname` should be replaced by *your* last and first names, respectively. Do not forget to use the **`fclose`** command in your code. The first 3 lines of the text file should be:

```
Year    Rate (percent)
1993      11.28
1994      -0.06
..         ..
..         ..
```

b) Assume you started with $1000 in an investment account at the end of 1992. Use the annual investment rates provided, determine the balance in the account at the end of each year from 1992 through 2007, with no withdrawal. Print your end-of-year balances to the screen with the first 3 lines displaying the following format:

```
Year       Balance
1992      $1000.00
1993      $1112.80
..         ..
..         ..
```

c) Plot the rates of return from 1993 to 2007 as a function of the year. Properly label both axes, and give your plot a title.

When you are done, post your m-file to the correct folder:

1. Double-click on "My Network Places". If it is not on your desktop, look in your start menu.
2. Double-click on "[DFS] Root". *Not [AFS] Root*.
3. Log in with your email address and password.
4. Double-click on Academic Affairs.
5. Double-click on ME.
6. Double-click on ME123.
7. Double-click on Exams.
8. Double-click on the folder with your section number.
9. Copy and paste your m-file to this folder.

NOTE: All programming must stop at 8:30pm. You will have a few minutes after that to post your file if you need that time.