

**EXAM 1 – WRITTEN PORTION**

NAME \_\_\_\_\_

SECTION NUMBER \_\_\_\_\_

CAMPUS MAILBOX NUMBER \_\_\_\_\_

EMAIL ADDRESS \_\_\_\_\_@rose-hulman.edu

Written Portion	/ 40
Computer Portion	/ 60
Total	/ 100

USE MATLAB SYNTAX FOR ALL PROGRAMS AND COMMANDS YOU WRITE

**Problem 1:**

(4 points) Consider the following code:

```
clc
clear variables
g = 9.8;
v0 = 100.0;
t = 5.0;
y = v0 * t - 0.5 * g * t * t;
velocity = v0 - g * t;
fprintf('\n %7.3f %7.3f \n', t, y, velocity);
```

When we run it, we get

```
5.000    377.500
51.000    >>
```

in the command window. Mark the changes on the code so that all of the numbers get printed on the same line.

**Problem 2:**

(4 points) What is the value of  $m$  after the following program executes?

```
clc
clear variables
m = 0;
for fred = 1:3:9
    m = m + 2 * fred;
end
```

- $m=24$
- $m=18$
- $m=14$
- $m$  is undefined—we've left the loop
- other:  $m=$  \_\_\_\_\_
- the program crashes (gives an error message)
- none of the above

**Problem 3:**

(4 points) Four code scraps are shown below. Which one is a correct implementation of the mathematical equation

$$y = \sum_{n=1}^3 \frac{1}{n^3}$$

a. `clc`  
`clear variables`  
`y = 1;`  
`for n = 1:3`  
    `y = y + 1.0 / (n^3);`  
`end`

b. `clc`  
`clear variables`  
`y = 0;`  
`for n = 1:3`  
    `y = y + 1.0 / (n^3);`  
`end`

c. `clc`  
`clear variables`  
`y = 1;`  
`for n = 1:3`  
    `y = 1.0 / (n^3);`  
`end`

d. `clc`  
`clear variables`  
`y = 0;`  
`for n = 1:3`  
    `y = 1.0 / (n^3);`  
`end`

e. None of these code scraps is correct.

**Problem 4:**

(4 points) If the following code is run in Matlab, what is the final value of n?

```
i = 2;  
j = 4;  
k = 6;  
if ((i + j) > k) & (k > 2)  
    n = k * j * i;  
elseif j~=4  
    n = k + j + i;  
else  
    n = (k + j) / i;  
end
```

- a. n = 48
- b. n = 12
- c. n = 5
- d. n = 8
- e. there is an error in the code and it will not run

**Problem 5:**

(4 points) If the following code is run in Matlab, what is printed to the command window?

```
count = 0;  
n = 80;  
while (count < 3) | (n <= 20)  
    count = count + 1;  
    n = n / 2;  
end  
fprintf('The value of n = %3i \n', n);
```

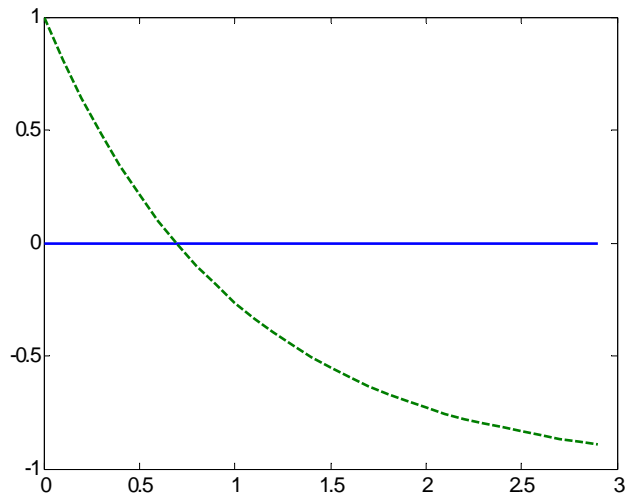
- a. The value of n = %3i
- b. The value of n = 5
- c. The value of n = 80
- d. The value of n = 10
- e. The value of n = 20
- f. Something else; explain: \_\_\_\_\_

**Problem 6:**

(4 points) The following code segment produces the 2D plot shown below.

```
for i = 1:30
    t_vec(i,1) = (i - 1) * 0.1;
    f_vec(i,2) = 2.0 * exp(- t_vec(i,1)) - 1.0;
end

plot(t_vec, f_vec)
```



There are two lines displayed on the plot. The curved line is the expected result while the straight line is not.

Indicate the necessary change on the code to correct for the problem.

**Problem 7:**

(8 points) Write a short program using a for loop to multiply together all the odd numbers between 1 and 20. Assign the result to a variable called `total`. You do not need to print out the answer. Just write the code required to do the computation.

**Problem 8:**

(8 points) Write a short program using a for loop to generate a matrix called `mat` which contains:

First row – a vector which starts at 0 and ends at 10 with an increment of 0.1;

Second row – a vector which calculates the tangent of the corresponding component of the first row;

Third row – a vector which calculates the square root of the corresponding component of the first row.

You do not need to print out the answer. Just write the code required to do the computation.