EXAM 1 – WRITTEN PORTION

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Written Portion	/ 48
Computer Portion	/ 52
Total	/ 100

USE MATLAB SYNTAX FOR ALL PROGRAMS AND COMMANDS YOU WRITE

Problem 1: (4 points) Consider the code scrap shown below:

```
a=10;
b=5;
if (a > 5)
    fprintf('I like cats.\n');
elseif (b==5)
    fprintf('I like dogs.\n');
else
    fprintf('I like cats and dogs.\n');
end
```

What prints when we run this code?

(a) I like cats.

(b) I like dogs.

(c) I like cats and dogs.

(d) I like cats.
I like dogs.
I like cats and dogs.

(e) Other (explain).

Problem 2: (4 points) You are given a matrix called C:

$$C = \begin{bmatrix} 1 & 2 \\ 2 & 4 \\ 3 & 6 \\ 4 & 8 \\ 5 & 10 \end{bmatrix}$$

and a code segment:

```
[m n] = size(C)
for i = 1:m
    C(i,2) = C(i,2) + 1;
end
```

What is C after the code is executed?

Problem 3: (8 points) Write a short program using a `for` loop to generate a matrix called `my_matrix` which contains the following entries:

First row – degrees starting at 0 and ending at 10 with an increment of 0.1;

Second row – the tangent of the corresponding entry in the first row;

Third row – the square root of the corresponding entry in the first row.

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

Problem 4: (4 points) What is the value of `fred` after this code scrap runs?

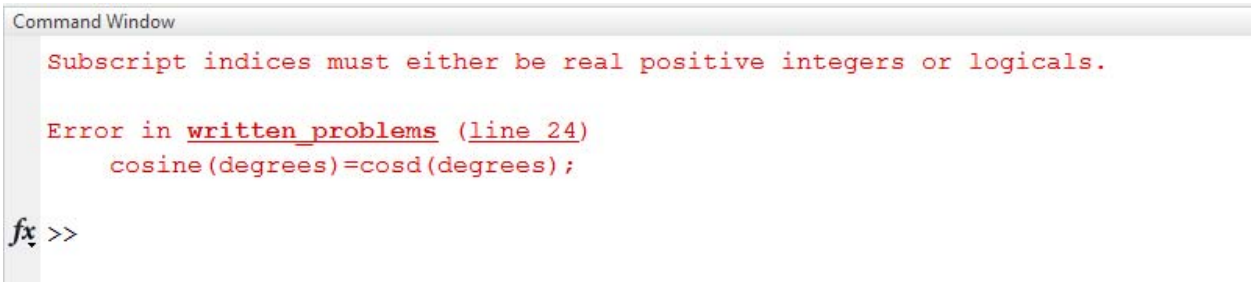
```
fred=6;
for i=1:3
    fred=fred+fred;
end
```

(a) `fred=6`
(b) `fred=18`
(c) `fred=48`
(d) `fred=9`
(e) other (explain).

Problem 5: (4 points) Consider the code scrap shown below:

```
for degrees=0:360
    cosine(degrees)=cosd(degrees);
end
```

It is supposed to create a vector of the cosines of the angles from 0 to 360, but instead we get the error



On the code, mark the change(s) required to make the code perform correctly.

Problem 6: (4 points) What is the value of C after this code scrap executes?

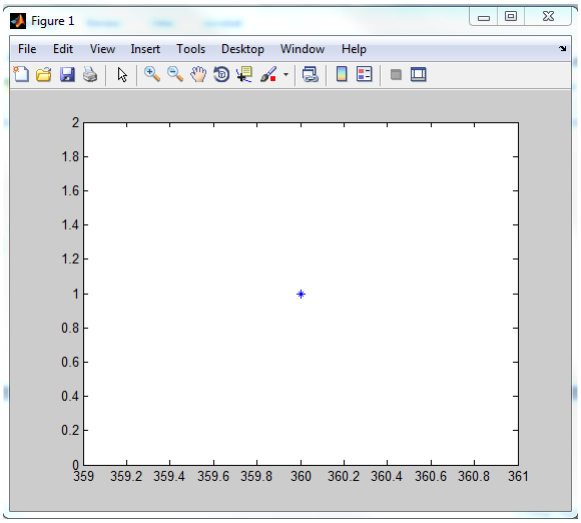
```
for i=1:3
    for j=1:2
        C(i,j)=i+j;
    end
end
```

Problem 7: (4 points) What is the value of B after this code scrap executes?

```
for i=1:3
    for j=1:2
        if (i>j)
            B(i)=i;
        else
            B(i)=j;
        end
    end
end
```

Problem 8: (4 points) The code below is supposed to plot a cosine curve, but we just get the figure shown to the right. Mark the change(s) on the code to make the code work correctly.

```
clc
clear variables
close all
for angle=10:10:360
    cosine=cosd(angle);
end
plot(angle,cosine,'*')
```



Problem 9: (4 points) We wanted to print a table of the integers from 1 to 5 and their squares and cubes. We wrote the code shown below:

```
for i=1:5
    fprintf('integer   square    cube \n');
    squared=i*i;
    cubed=i*i*i;
    fprintf('   %1.0f        %2.0f      %3.0f \n',i,squared,cubed);
end
```

However, we get this output:

```
Command Window
integer   square    cube
   1         1        1
integer   square    cube
   2         4        8
integer   square    cube
   3         9       27
integer   square    cube
   4        16       64
integer   square    cube
   5        25      125
fx >>
```

Mark the change(s) on the code to make a proper table.

Problem 10: (4 points) This code is supposed to print the values of a and b to the command window:

```
a=5;
b=10;
fprintf('a is %1.0f and b is %1.0f \n');
```

However, all we get when we run the code is

```
Command Window
fx a is >>
```

Mark the change(s) on the code to make it run correctly.

Problem 11: (4 points) Suppose we define an acceleration vector and we want to integrate it numerically to find the velocity. Recall that the mathematical equation for this is

$$v(t) = \int_0^t a(t)\,dt = \sum_{i=1}^{N} a_i\,\Delta t$$

The code we write looks like this

```
accel=[0 10 20 30 40 50 60 70 80 90];
dt=0.1;
vel(1)=0;
for i=1:10
    vel(i)=accel(i)*dt;
end
```

After we run the code we see this in the workspace. Those can't be the correct velocities because the acceleration is a straight line so we would expect the velocity to be a parabola. Fix the code so that it does the proper numerical integration. (You may assume that the time difference `dt` is correct.)

Workspace

Name	Value	Min	Max
accel	[0,10,20,30,40,50,60,70,80,90]	0	90
dt	0.1000	0.1000	0.1000
i	10	10	10
vel	[0,1,2,3,4,5,6,7,8,9]	0	9