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Exam 2(250 points)

CS 101
Spring 2015
90 minutes

NJIT

New Jersey's Science &
Technology University

Name: ....

ID Number: .... **Exam Number:** | .... |

Grade: 1: ... 2: ... 3: ... 4: ... 5: ... 6: ... 7: ... 8: ... 9: ... 10: ... Total: ....

Solve **ALL the problems** in the space provided

Read the Problems CAREFULLY!

There are 5 (FIVE) pages this page included

Problem 1. (25 POINTS)

Write the output of the following two fprintf commands in the indented and boxed space underneath it that can accommodate 25 characters, one per box. (Three lines of output are provided; you might not need them all).

```
>> fprintf('a=%4d b=%-2d c=%03d \n',10,2,3);
```

```
-------------------------------------------------------------------
| | | | | | | | | | | | | | | | | | | | | | | | |   % First line
| | | | | | | | | | | | | | | | | | | | | | | | |
-------------------------------------------------------------------
| | | | | | | | | | | | | | | | | | | | | | | | |   % Second line
| | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | | | | | |   % Third line
| | | | | | | | | | | | | | | | | | | | | | | | |
-------------------------------------------------------------------
```

```
>> fprintf('%7.3f %+07.1f\n', 12.34, 5.60);
```

```
-------------------------------------------------------------------
| | | | | | | | | | | | | | | | | | | | | | | | |   % First line
| | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | | | | | |   % Third line
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-------------------------------------------------------------------
```

Problem 2. (25 POINTS)

What does the following MATLAB program print for each one of the following 5 cases?

(a) if var1 = 1, var2 = 0, var3 = 0,
(b) if var1 = 0, var2 = 1, var3 = 1,
(c) if var1 = 1, var2 = 1, var3 = 0,
(d) if var1 = 0, var2 = 0, var3 = 1,
(e) if var1 = 0, var2 = 0, var3 = 0.

```
if (var1)
  fprintf('Block 1\n');
elseif (var2)
  fprintf('Block 2\n');
elseif (var3)
  fprintf('Block 3\n');
else
  fprintf('Block 4\n');
end
```

THIS IS THE END OF PAGE 2 CONTAINING PROBLEMS 1 AND 2. TURN PAGE.

Problem 3. (25 POINTS)

Variables a, b, c correspond to the angle values of a triangle, i.e. $a + b + c$ is equal to 180 degrees. Add code in the control expressions so that this if statement detects correctly the type of the triangle defined by angles a,b,c. You are to add code in lines 1 and 3 only; no reordering or other modifications are allowed.

```
a= 58+2*round(rand);
b= input('b= ');
c=180-a-b;

 if  (                                              )           % LINE 1
     disp('isosceles');                                         % LINE 2
 elseif (                                           )           % LINE 3
     disp('equilateral');
 else
     disp('scalene');
 end
```

Problem 4. (25 POINTS)
What does the following MATLAB program print?

```
>>  x=10;
>>  y=20;
>>  z=15;
>>  if ( x+z  >  2*y )
        fprintf('this\n');
    elseif ( 3*x < 4*z)
        fprintf('that\n');
    else
        fprintf('what\n');
    end
```

Problem 5. (25 POINTS)
Which of the three programs A, B, C prints the integers 30, 20, 10, one integer per line? Name all that apply or write NONE if you believe none of A,B,C is up to this task!

```
% Code A                      % Code B                      % Code C
for ii= 2:4                   for ii= -3:-1:-1              for ii= [60 40 20]
 fprintf('%d\n',50-ii*10);     fprintf('%d\n',-ii*10);       fprintf('%1d\n',ii/2);
end                           end                           end
```

THIS IS THE END OF PAGE 3 CONTAINING PROBLEMS 3,4 AND 5. TURN PAGE.

Problem 6. (25 POINTS)

(a) With reference to the code of Problem 7 below, how many (local) variables are defined? What are their names? (5 points)

(b) What does the following loop print? (10 points)

```
for ii=1:2:11
  fprintf('%d\n',ii);
  if ii==7
    continue;
  end
end
```

(c) What does the following loop print? (10 points)

```
for ii=1:3:11
  fprintf('%d\n',ii);
  if ii==7
    break;
  end
end
```

Problem 7. (25 POINTS)

What does the following MATLAB program print?

```
A= [ 6 18  15 30  6 13   15 7  6 15 11 ];          %
n= length(A);                                       %
for k = 1:n                                         %
 switch mod(A(k),9)                                 %
   case 0                                           %
    fprintf('do');                                  %
   case 1                                           %
    fprintf('you');                                 %
   case 2                                           %
    fprintf('?');                                   %
   case 3                                           %
    fprintf('I');                                   %
   case 4                                           %
    fprintf('like');                                %
   case 5                                           %
    fprintf('\n');                                  %
   case 6                                           %
    fprintf(' ');                                   %
   otherwise                                        %
    fprintf('matlab');                              %
  end
 end
```

```
--------------------------------------------------------------------
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | % First line
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--------------------------------------------------------------------
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | % second line
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--------------------------------------------------------------------
```

THIS IS THE END OF PAGE 4 CONTAINING PROBLEMS 6 AND 7. TURN PAGE.

Problem 8. (25 POINTS)
The following program is supposed to find the sum of the sequence $1^3 + 2^3 + \ldots + (n-1)^3 + n^3$ and store that result into variable AAA using a while loop. (a) Does the program work as stated ? Explain. (b) If not, how can you modify the code so that it does what it is expected to do. In the latter case, there will still be a while loop and only minimal intervention is allowed.

```
n=input('value of n = ');  % Find the sum  tot  =  1^3 + 2^3 + 3^3 + ... +  n^3
 AAA=1;
 ii=1;

 while (ii <= n)

    AAA = ii^3           ;

 end
 disp(AAA);
```

Problem 9. (25 POINTS)
Provide code for a for loop that computes the sum of the first n integers $1 + 2 + \ldots + n$. The result is printed through variable Stot. The first and last lines of the solution are given below. Fill in the intermediate lines.

```
 n = input('value of n = ');                        % FIRST LINE




 disp(Stot);                                         % LAST LINE
```

Problem 10. (25 POINTS)
We want to print the integers 4,3,2,1, one per line, with the following MATLAB while loop. Only lines 2 and/or 3 may be modified. How do we complete/modify lines 2 and 3 to achieve this? Fill in the necessary information, as needed.

```
limit = 5    ;
ii=          ;                      % THIS IS LINE 2
while (ii         )                 % THIS IS LINE 3
  ii= ii - 1 ;
  fprintf('%d\n',ii);
end
```