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GTID (ex: 903XXXXXX): _____

CS 1371
Practice Exam 2
Form B

- Write your name and GTID on every page or **you could lose 5 points on the exam.**
- Check the board at the front of the room for any updates/clarifications during the exam.
- All logical values should be denoted using `true` or `false` NOT 1 or 0
- An appendix containing useful information is provided separately.
- If there is a problem that you cannot figure out, skip it and move on. Be mindful of how many points each question is worth.
- If you run out of room, use the back page. Be sure to mark that you are continuing your answer on the back page!
- You have fifty minutes. Good Luck!

I pledge that I have neither given nor received help on this exam:

_____ _____

Signature Date

Problem 1. Answer the following tracing questions. (20 points)

```
1  function [newArr, maxSum] = bestSum(arr)
2  [r,c] = size(arr);
3  newArr = [];
4  for i = 1:c
5        temp = 0;
6        for j = 1:r
7              temp = temp + arr(j, i);
8        end
9        newArr = [newArr temp];
10       % i = i + 1;
11 end
12
13 ind = 2;
14 maxSum = newArr(1);
15
16 while ind <= length(newArr)
17       if newArr(ind) > maxSum
18             maxSum = newArr(ind);
19       end
20       ind = ind + 1;
21 end
22 end
```

Assume that the above function is defined in the current directory. The following code is then run in the Command Window.

```
>> arr = [2 0; 3 1; 2 5; 4 8];
>> [new1, max1] = bestSum(arr);
```

a. After the function is run, what will be the values of `new1` and `max1`? (3 points each)

```
new1 =


max1 =
```

b. Using the same input given in part a, how many **total** times will the for-loop on lines 6-8 run? (3 points)

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c. Suppose that Line 10 is uncommented. Does the for-loop now operate differently? Explain why or why not. If it operates differently, indicate how the values of `temp` and `newArr` change. If the code errors, indicate what the error would be. (4 points)

d. Convert the following for loop into a while loop. Assume that `vec` is a 1xN double vector. (7 points)

```
1  diffVec = [];
2  for x = 1:length(vec)-1
3   diffVec = [diffVec (vec(x+1) - vec(x))];
4  end
```

Write your code here:

Problem 2. Answer the following multiple choice questions. (20 points)

a. Consider the following block of code. You may assume that `vec` is a 1xN double vector that exists in the scope of your current script.

```
1 mask = vec >= 0;
2 if sum(mask) == length(vec)
3 out = 'Woo';
4 elseif isequal(sum(vec(mask)), sum(vec(~mask)))
5  out = 'Halfsies';
6 else
7 out = 'No balance'
8 end
```

Choose **ALL OF THE FOLLOWING** blocks of code which accomplish the same task as the above code. (8 points)

□ Option A

```
1  mask = vec >= 0;
2  switch all(mask)
3    case {true}
4         out = 'Woo';
5    otherwise
6         switch sum(vec(mask))
7              case sum(vec(~mask))
8                   out = 'Halfsies';
9              otherwise
10                  out = 'No balance';
11        end
12 end
```

□ Option B

```
1  new = abs(vec)
2  switch vec
3    case new
4         out = 'Woo';
5    otherwise
6         mask1 = sum(vec >= 0)
7         mask2 = sum(vec < 0)
8         if mask1 == mask2
9              out = 'Halfsies';
10        else
11             out = 'No balance'
12        end
13 end
```

□ Option C

```
1 mask = vec >= 0;
2 switch vec
3    case sum(mask)== length(vec)
4         out = 'Woo';
5    case isequal(sum(vec(mask)), sum(vec(~mask)))
6         out = 'Halfsies';
7    otherwise
8         out = 'No balance';
9 end
```

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b. You are given two vectors: a 1xN char vector called `teams` with the name of two teams **separated by a single space**, and a 1x2 double vector called `wins` with the respective number of wins that each team has. You want to figure out which team to bet on, so write a few lines of code in accordance with the following rules to help you:
   - If the first team has less than 10 wins, you immediately bet on the second one.
   - If the second team has more wins than the first team you bet on the second team.
   - If neither of the above two conditions are true, bet on the first team.

   Store the **name of the team** you want to bet on in a variable named `bet`. (12 points)

   Test Case:

```
teams = 'Chelsea Liverpool'
wins = [4 8]

>> bet = 'Liverpool'
```

   Write your code here:

Problem 3. Answer the following tracing questions. (30 points)

```
1  function [forecast, daysOff] = snowDay(city, precip, temp)
2  if temp <= 32 & precip > 1
3     forecast = sprintf('%d inches of snow!', precip);
4     switch city
5           case {'Atlanta', 'Savannah', 'Tampa', 'Orlando'}
6                 daysOff = 10
7           case {'Boston', 'New York', 'Ithaca'}
8                 daysOff = 1;
9           otherwise
10                daysOff = 3;
11    end
12 elseif temp <= 32
13    forecast = sprintf('%d degrees. Bundle up!', temp);
14    daysOff = 0;
15 else
16    forecast = sprintf('%d degrees.', temp);
17    daysOff = 0;
18 end
19 end
```

Assume that the above function is defined in the current directory. The following code is then run in the Command Window.

```
>> [forecast1, daysOff1] = snowDay('Atlanta', 0, 30);
```

a. What are the values of forecast1 and daysOff1? (10 points)

```
forecast1 =


daysOff1 =
```

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b. Please give a set of input values for the above function that could produce the following output values. (12 points)

```
>> [forecast2, daysOff2] = snowDay(city, precip, temp);
forecast2 => '5 inches of snow!'
daysOff2 => 3
```

```
city =
```

```
precip =
```

```
temp =
```

c. Lines 15 – 17 are deleted and the following line of code is run in the command window.

```
>> [forecast3, daysOff3] = snowDay('New York', 2, 50);
```

After the lines are deleted, will the code error? Please select the correct choice and answer the follow-up question. (8 points)

◯ The code will error

Explanation:

◯ The code will not error

```
forecast3 =
daysOff3 =
```

Problem 4. Write the following function. <u>Do NOT hardcode!</u> (30 points)

Function Name: `matrixManipulator`

Inputs (2): (double) NxM array
(double) 1xM vector

Outputs (2): (double) a manipulated array
(double) a calculated value

Function Description: You are to manipulate a given NxM array and a 1xM vector.

<u>Write a function that completes the following steps in order:</u>

- Sort the columns of `arr` in ascending order according to the values in the first row.
- Replace all negative values in `arr` with the equivalent positive value (i.e. -1 should become 1, -7 should become 7, etc.)
- Delete all rows that have a maximum value less than 4.
- Replace every even row in `arr` with `vec`.
  Note: `arr` and `vec` will have the same number of columns.
- Find the sum of the right half of `arr` **excluding** the first row and make the resulting value the second output of your function.
  Note: `arr` is guaranteed to have an even number of columns.

Test Case:

```
arr =         [3     2     1     4;
              -5    -1     7     0;
             -11    -5     0     9;
               4     4     4     2;
               0     1     3     0]

vec = [20, 10, 20, 10]

>>  [manipulatedArr, num] = matrixManipulator(arr, vec)


manipulatedArr => [1     2     3     4;
                   20    10    20    10;
                    0     5    11     9;
                   20    10    20    10]

num=> 70
```

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Write your FUNCTION here:

EXTRA SPACE: if you use this space, be sure to label which question you are answering. In the original question space, CLEARLY leave a note that you have continued the answer here.