Maharishi University of Management  
Fairfield, Iowa, USA  
Computer Professionals Program  
Master of Science in Computer Science Cooperative Program

**Applicant Information Form**

Teclehaimanot Tekeste logged on

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Applicant ID: 145056

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The purpose of this short test is to assess your ability to solve elementary programming problems in a language of your choice. Write your solutions in Java if you are familiar with that language; otherwise use one of these languages: C, C++, or C#. If you do not have access to a compiler for your language, write your answers in a text editor such as notepad and mention in a comment that you did not use a compiler.

For each of the problems below, write the simplest, clearest solution you can, in the form of a short program. Answer as much as you can for a problem, even if you do not have the complete answer.

If you are using C or C++ and the function you are writing requires an array parameter then you will also have to have a parameter that is the length of the array. This is not necessary in C# or Java since an array is an object in those languages and has a length method that returns the length of the array.

You do not need to do any I/O, i.e., you can hard-code your input data and do not have to write out anything to the console. Keep it simple! We are primarily interested in what you write in the body of the function. However, please be sure that your solution will work for all valid input data.

The clock is ticking now, so you don't have time to ask for clarifications on any of the questions. If something is not clear to you, resolve it yourself and state in a comment in the program what was unclear and how you resolved it.

When you have finished an answer, copy and paste it into the text box associated with the question and click the submit button to save it in our database. If you change an answer and submit it again, the previous version of the answer will be overwritten with the new version. 

1. Write a function named *largestDigit* that returns the largest digit of its integer argument. For example largestDigit(3185) returns 8 and largestDigit(-65665) returns 6.

The function signature is  
   int largestDigit (int n)

Hint: use modulo base 10 arithmetic and integer division to isolate the digits of the number.

Copy and paste your answer here and click the "Submit answer" button

  
   
You should see a confirmation popup after hitting the submit button above. If you do not see a confirmation popup, please [email](mailto:webapps@cs.mum.edu?subject=Pretest%20Answer) your answer. 

2. A **Daphne array** is defined to be an array where the minimum and maximum values occur exactly once and the minimum value occurs after the maximum value in the array. For example {10, -2, 3, -6, 9} is a Daphne array because it satisfies all the conditions:

1. The maximum value 10 occurs only once
2. The minimum value -6 occurs only once
3. -6 occurs after 10 in the array.

Write a function named *isDaphneArray* that returns 1 if its array argument is a Daphne array, otherwise it returns 0.

If you are programming in Java or C#, the function signature is  
   int isDaphneArray(int[ ] a)

If you are programming in C or C++, the function signature is  
   int isDaphneArray(int a[ ], int len) where len is the number of elements in a.

Copy and paste your answer here and click the "Submit answer" button

  
   
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3. An **Olympic array** is defined to be an array in which every value is greater than or equal to the sum of the values less than it. The sum of the values less than the minimum value in the array is defined to be 0.

For example, {3, 2, 1} is an Olympic array because

1. 1 is the minimum value and by definition the sum of the values less than it is 0. Since 1 is greater than 0, it satisfies the condition.
2. There is only one value less than 2 and 2 is greater than it, so the value 2 satisfies the condition.
3. The values 1 and 2 are less than 3 and 3 is equal to their sum, so the value 3 satisfies the condition.

Hence all elements of the array satisfy the conditions and the array is an Olympic array.

{2, 2, 1, 1} is also an Olympic array because the values less than 2 sum to 2.

{1, 1000, 100, 10000, 2} is also an Olympic array.

{1, 2, 1, 3, 2} is not an Olympic array because 3 is not greater than or equal to 1+2+1+2.

{1, 2, -1, 2, 2} is not an Olympic array because -1 is the minimum value but it is not greater than or equal to 0.

Write a function named *isOlympic* that returns 1 if its array argument is an Olympic array, otherwise it returns 0.

If you are writing in Java or C#, the function signature is  
   int isOlympic (int[ ] a)

If you are writing in C or C++, the function signature is  
   int isOlympic(int a[ ], int len) where len is the number of elements in the array.

Hint: use a nested loop.

Copy and paste your answer here and click the "Submit answer" button

  
   
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