

Programming -1: Sheet #1

100 marks



Cairo University, Faculty of
Computers and Information

Notes:

1. Each Student will deliver his assign solution as hard copy in Computer science TAs Room, second floor, New building.
2. **Due Date Wednesday 2/4/2014 12:30 PM,**
NO accepted submission after due date.
3. You can submit your sheet solution to
 1. Eng Chery and Eng Mai Ibrahim (from 9:30 AM to 11:00 Am)
 2. Eng Hanaa and Eng Mostafa Ayman (from 11:00 AM to 12:30 PM)
4. Cheaters will be graded -100
5. Your solution must run in a valid way using a c++ compiler, then print your code and submit it with a cover contains your name, ID, group

Question 1 [5 marks]: As you know, $5! \text{ (Factorial 5)} = 5*4*3*2*1$. Write a C++ program which takes an integer number n and print its factorial. You should repeat this operation until $n \leq 0$

Sample Input:

5
10
2
1
0

Sample Output:

120
3628800
2
1

Question 2 [10 marks]: Write a program to print the maximum two numbers in a list of numbers entered by user. User should specify first the number of the values that he will enter. Use only one for loop. User should enter at least two values.

Sample of execution

Enter the count of numbers: 5

Enter num1: 22.5

Enter num2: 56.3

Enter num3: 75

Enter num4: 2.1

Enter num5: -7

The output

The max two numbers are: 75, 56.3

Programming -1: Sheet #1

100 marks



Cairo University, Faculty of
Computers and Information

Question 3 [5+5+10 =20 marks]: You are requested to draw the following shapes using '*'. You will take an integer and according to it you will display the height of the three shapes. The three shapes are separated by newline "\n"

Sample Input: 5

Sample output:

```
*
***
*****
*****
*****

      *
     ***
    *****
   *****
  *****
 *****
*****
 *****
  *****
   ***
    *

*               *
***           ***
*****       *****
*****     *****
*****   *****
***** *****
```

Programming -1: Sheet #1

100 marks



Cairo University, Faculty of
Computers and Information

Question 4 [15 marks]: You have a set of numbers; you need to know the summation, multiplication, count of odd numbers, count of even numbers and average of them. Write a program to know the prev. Your program should continue taking numbers till entering number < 0

Sample Input:

1
5
10
7
100
-1

Sample Output:

Summation is: **123**
Multiplication is: **35000**
Odd Count is: **3**
Even Count is: **2**
Average is: **24.6**

Programming -1: Sheet #1

100 marks



Cairo University, Faculty of
Computers and Information

Question 5 [20 marks]: In this problem, you will be analyzing a property of an algorithm whose classification is not known for all possible inputs.

The Problem

Consider the following algorithm:

```
1.      input n
2.      print n
3.      if n = 1 then STOP
4.                if n is odd then  $n=3n+1$ 
5.                else  $n=n/2$ 
6.      GOTO 2
```

Given the input 22, the following sequence of numbers will be printed 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1

It is conjectured that the algorithm above will terminate (when a 1 is printed) for any integral input value. Despite the simplicity of the algorithm, it is unknown whether this conjecture is true. It has been verified, however, for all integers n such that $0 < n < 1,000,000$ (and, in fact, for many more numbers than this.)

Given an input n , it is possible to determine the number of numbers printed (including the 1). For a given n this is called the *cycle-length* of n . In the example above, the cycle length of 22 is 16.

For any two numbers i and j you are to determine the maximum cycle length over all numbers between i and j .

The Input

The input will consist of a series of pairs of integers i and j , one pair of integers per line. All integers will be less than 1,000,000 and greater than 0.

You should process all pairs of integers and for each pair determine the maximum cycle length over all integers between and including i and j .

You can assume that no operation overflows a 32-bit integer.

The Output

For each pair of input integers i and j you should output i, j , and the maximum cycle length for integers between and including i and j . These three numbers should be separated by at least one space with all three numbers on one line and with one line of output for each line of input. The integers i and j must appear in the output in the same order in which they appeared in the input and should be followed by the maximum cycle length (on the same line).

Sample Input

```
1 10
100 200
201 210
900 1000
```

Sample Output

```
1 10 20
100 200 125
201 210 89
900 1000 174
```

Programming -1: Sheet #1

100 marks



Cairo University, Faculty of
Computers and Information

Question8 [30 marks] : Your father decided to open a new electrical shop which contains only Refrigerators, Washers, Cooker and T.Vs. your father knows that you can write C++ programs because you're a student in FCI so he required from you to write a C++ program for his shop and you MUST do it. He told you that the program should take 4 integer numbers which are number of (Refrigerators, Washers, Cooker and T.Vs) in the stock. When a customer comes to but something, you should first check if you have enough pieces in the stock or not. If yes, decrease them from the stock else display a message saying "We don't have enough pieces in the stock". Also you should have the option to add pieces in the stock. You should repeat this operation. **(You must solve this problem using functions)**

Sample Console:

Enter # of Refrigerators in the stock: 2
Enter # of Washers in the stock: 3
Enter # of Cookers in the stock: 1
Enter # of T.Vs in the stock: 4

1. *Add Refrigerators to the stock*
 2. *Add Washers to the stock*
 3. *Add cookers to the stock*
 4. *Add T.Vs to the stock*
 5. *Remove Refrigerators to the stock*
 6. *Remove Washers to the stock*
 7. *Remove cookers to the stock*
 8. *Remove T.Vs to the stock*
 9. *Display stock*
 10. *Exit*
- Enter your choice: 5*

Enter the required *Refrigerators* pieces to be removed: 5

We don't have enough pieces in the stock

1. *Add Refrigerators to the stock*
2. *Add Washers to the stock*
3. *Add cookers to the stock*
4. *Add T.Vs to the stock*
5. *Remove Refrigerators to the stock*
6. *Remove Washers to the stock*
7. *Remove cookers to the stock*
8. *Remove T.Vs to the stock*
9. *Display stock*
10. *Exit*

Enter your choice: 9

You have 2 pieces of Refrigerators.

You have 3 pieces of Washers.

You have 1 piece of cookers.

You have 4 pieces of T.Vs.

Programming -1: Sheet #1

100 marks



Cairo University, Faculty of
Computers and Information

1. *Refrigerators to the stock*
2. *Add Washers to the stock*
3. *Add cookers to the stock*
4. *Add T.Vs to the stock*
5. *Remove Refrigerators to the stock*
6. *Remove Washers to the stock*
7. *Remove cookers to the stock*
8. *Remove T.Vs to the stock*
9. *Display stock*
10. *Exit*

Enter your choice: 6

Enter the required *Washers* pieces to be removed: **1**

One piece of washers has been removed

1. *Refrigerators to the stock*
2. *Add Washers to the stock*
3. *Add cookers to the stock*
4. *Add T.Vs to the stock*
5. *Remove Refrigerators to the stock*
6. *Remove Washers to the stock*
7. *Remove cookers to the stock*
8. *Remove T.Vs to the stock*
9. *Display stock*
10. *Exit*

Enter your choice: 10

Thanks for using my program