Lab 5: Functions and loops

10:45 am to 12:45 pm

Total marks: 30

General instructions

- **No compensation or makeup lab**
- **Don't discuss with peers.**
- **Cheating cases will be given ZERO.**
- **You can ask only relevant queries from TAs.**
- **Strictly follow the instructions of TAs. Any misconduct will be dealt strictly.**
- **Complete your tasks by 11:45am. Last hour is reserved for evaluation**

Task 1: Simple calculator

You are required to design a Calculator. Take two numbers a and b as an input from the user.

You need to implement the following functions:
1. double Add(double a, double b); *a+b*
2. double Subtract(double a, double b); *a-b*
3. double Divide(double a, double b; *a/b*
4. double Multiply(double a, double b); *a*b*
5. double takeSin(double a); *sin(a)*
6. double takecos(double a); cos(a)
7. double taketan(double a); *tan(a)*

Take input of two numbers in main() and then ask the user which function he wants to call. Then call the respective functions E.g. if the user enters 3 then divide function will be called. Keep running the logic till the user enters a character other than 'y'. You can take input from the user in character for this purpose. You might need to include relevant c++ libraries to deal with mathematical functions e.g. <math>.

Task 2: (3n+1 problem)

Consider the following algorithm to generate a sequence of numbers. Start with an integer n. If n is even, divide by 2. If n is odd, multiply by 3 and add 1. Repeat this process with the new value of n, terminating when n = 1. For example, the following sequence of numbers will be generated for n = 22:
22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
For an input n, the cycle-length of n is the number of numbers generated up to and including the 1. In the example above, the cycle length of 22 is 16. Given any two numbers i and j, you are to determine the maximum cycle length over all numbers between i and j, including both endpoints.

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.

Output:

For each pair of input integers i and j, output i, j in the same order in which they appeared in the input and then the maximum cycle length for integers between and including i and j. These three numbers should be separated by one space, with all three numbers on one line and with one line of output for each line of input.

Sample Input

1 10
100 200
201 210
900 1000

Sample Output

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