COMP281 Assignment 1 – C Programming

- **The following 5 problems will be available as Assignment 1 on the online judging system available at** http://intranet.csc.liv.ac.uk/JudgeOnline/
- **You need to write a valid C program that solves each of these problems – it must read the input, as specified in the problem description then print the solution to the given problem for that input.**

- Input is read from the standard input, in the same way that you read input from the keyboard as shown in lectures (e.g., using `scanf`). Output is also printed to the standard output, as you have seen (e.g., using `printf`).

- When you are satisfied that your programs work correctly, you must submit them through the departmental submission system, as described below.

- You must also include a brief report describing your solutions to the problems. This should be **maximum** one side of A4 paper (although there is no penalty for a longer report) and should give a description of how each of your solutions works. This should include describing the algorithm used to reach the solution, describing your use of any C language features (that were not discussed in lectures) and identifying any resources that you have used to help you solve the problems.

- This assignment is worth 30% of the total mark for COMP281

- 50% of the marks will be awarded for programs that correctly solve the problem for all test cases. All problems are weighted equally and each counts for 20% of this total.

- 40% of the marks will be awarded depending on the style, comments and efficiency of the solution. All problems are weighted equally and each counts for 20% of this total.

- 10% of the marks will be awarded for the quality and depth of the accompanying report

- See separate marking guidelines for more details.

Submission Instructions

- Name each of your c files according to the problem number; i.e., 1014.c,1017.c,1025.c,1060.c and 1030.c. Place all five of your C files and your report (in .pdf format) into a single zip file.
- All question have also been/will also be posted on www.csc.liv.ac.uk/JudgeOnline
- Before you submit your solutions, please first test them using the online judge. **You are required to** include the "Result" and the "RunID" in your C code as comments. **The OJ provides a RunID. RunIDs are not problem IDs.**
  - Example: the problem is 10xx. The solution has been accepted by the OJ, and the runID is 2033. You add to your code: /* 2033 Accepted */
  - Result is one of the following: Accepted, Wrong Answer, Presentation Error, Time Limit Exceeded, Memory Limit Exceeded, Output Limit Exceeded, Runtime Error, Compile Error
- Submit this zip file using the departmental submission system at

http://www.csc.liv.ac.uk/cgi-bin/submit.pl

Only the file submitted through this link will be marked

- **The deadline for this assignment 20/02/2015, 5:00pm**
- Penalties for late submission apply in accordance with departmental policy as set out in the student handbook, which can be found at:
  http://www.csc.liv.ac.uk/student/ugpdfhandbook.pdf

Problem 1014

Title: **Area and circumference of circles**

Description:

In this exercise you have to compute the area and circumference of a series of circles and output their sum. Specifically, the program will take two radii of two circles as input (r1 <= r2, both integers) and will output the sum of the areas and the circumferences of all circles starting with r1 and increasing at each step the radius by '1' until radius r2 has been reached. As an example, suppose 'r2-r1 = 2' then the program has to compute the sum of the areas and circumferences of three circles with radii r1,r1+1,r2

Remember that the area of a circle equals Pi*r^2 and the circumference equals 2Pi*r.

Set Pi to 3.14

Input:

Two integers r1 and r2 with r1<=r2

Output:

two floats, sum_of_areas and sum_of_circumferences.

Sample Input:

```
3 4
```

Sample Output:

```
78.500000
43.959999
```

Problem 1017

Title: **Product of integers in columns**

Description:

In this exercise you have to write a program that can compute the product of the numbers (integers in this case) in a series of columns.

Input:

The first number of the input, N, describes the number of columns that will follow, then N columns follow. The first row will contain the first integer of each column. This number M will indicate how many numbers will follow in the respective column. Note that this means that not each column needs to be of the same length.

Output:

N numbers that represent the product of each column.

Sample Input:

```
4
3 2 3 4
1 1 1 2
2 3 2 2
3   4 3
      2
```

Sample Output:

```
6 3 8 24
```

Problem 1025

Title: Largest common factor and smallest common multiple

Description:

Input two positive integers. Compute their largest common factor and smallest common multiple.

Input:

Input two positive integers.

Output:

largest common factor and smallest common multiple.

Sample Input:

```
2 3
```

Sample Output:

```
1 6
```

Problem 1060

Title: Sort even integers

Description:

From the input of 10 numbers, sort only the even integers into ascending order.
Print the list with all odd numbers (including 0) in their corresponding place in the input and the even numbers sorted into ascending order.

Input:

10 integers separated by spaces. (All integers are at most 32 bits)

Output:

An evenly sorted list (even numbers in ascending order, odd numbers unchanged)

Sample Input:

```
5 3 4 2 1 6 8 7 10 9
```

Sample Output:

```
1 3 2 4 5 6 8 7 10 9
```

Sample Input 2:

```
11 16 14 12 10 8 6 4 2 1
```

Sample Output 2:

```
11 2 4 6 8 10 12 14 16 1
```

Problem 1030

Title: Precise Division

Description:

8/13=0.615384615384615384615384...

For 8/13, the 5-th digit after the decimal point is 8.

Given three positive integers a, b, and n (all at most 60000), you are asked to compute a/b and print out the n-th digit after the decimal point.

Input:

a b n (three positive integers)

Output:

The n-th digit after the decimal point of a/b

Sample Input:

8 13 5

Sample Output:

8