BIL 105E – Introduction to Scientific and Engineering Computing (C)

Spring 2016-2017

Homework 1
Prime Factorization

Assignment Date: 22.02.2017
Due Date: 01.03.2017 - 23:59
Duration One week

In this homework, you are expected to write a C program that gets an integer as input and calculates the prime factorization of the input.

Your C program should get an integer in the runtime using ***scanf(...)*** function in ***stdio.h*** library. Then it should calculate the prime factorization of the input integer and it should print the factorization in exponential form using ***printf(...)*** function in ***stdio.h*** library. If the input is not valid to find prime factorization, program should ask for a valid input until input is valid.. Printed output is expected to be in the following form:

$$PrimeNumber_1\text{^}Exponent_1 * PrimeNumber_2\text{^}Exponent_2 * \ldots * PrimeNumber_n\text{^}Exponent_n$$

where a $PrimeNumber_i < PrimeNumber_j$ if $i<j$.
If Exponent of any PrimeNumber is 0, it should not be printed as output.

Your program should return 0 if it could calculate prime factorization successfully.

You do not need to use any other library than ***stdio.h.***

Your C code should be compiled in gcc. If you code could not be compiled with gcc, you will get 0 for your homework. You are recommended to use SSH Secure Shell to connect to ITU servers to compile and test your program using gcc. You can use this link to learn how to install and use SSH Secure Shell.

Your C code should be compiled with the following command:

gcc homework1.c -o homework1

Your C program should be run with the following command:

./homework1

Input and Output Format

Before getting a number to calculate, you should print "*Enter a number:*".

Any number can be entered between -32767 and 32767 (limits of integer).

Lets assume user entered 525.

Your output will start with "*Prime factorization of 525:* " and continue with each prime number, a caret symbol (^) and exponent. Each prime number and exponent pair will have asterisk (*) symbol.
*ex :3^1 * 5^2 * 7^1*

If the input is not valid to calculate prime factorization, you should print "*Enter a valid number:*" and get another input. Program may request a valid number for unlimited time while the input is not valid.

Sample outputs from the execution of the program:

Enter a number:67
Prime factorization of 67: 67^1

Enter a number:525
*Prime factorization of 525: 3^1 * 5^2 * 7^1*

Enter a number:1
Enter a valid number:-3
Enter a valid number:5
Prime factorization of 5: 5^1

Evaluation Criterion:

- Compiling and linking with gcc
- Being able to use printf and scanf
- Evaluation of the validity of the input
- Correctness of the results
- Compliance with the inputs and outputs requested in the homework

The homeworks are individual assignments and you are expected to do it by yourself. Any form of cheating will not be tolerated.

For questions you can contact:
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