

# Programming Fundamentals Lab

**Lab 09****Marks 100****Instructions**

Work on this lab individually. You can use your books, notes, handouts etc. but you are not allowed to borrow anything from your peer student.

**Submission**

Put all the files of your solution in a zipped folder labeled with your **roll number**.

Upload the zipper file solution(s) folder at Google classroom (<https://classroom.google.com>) by **Thursday, April 23, 2020** before **05:00 PM**. No submission will be accepted after this deadline.

Please use your **email account at PUCIT domain** and the following code to join the class:

**Code:** 2oosi22

**What you have to do**

Program the following tasks in your C++ compiler and then compile and execute them. The name of your files will be according to the task given in this lab.

**Task 1****[10]**

Write a function `printNumbers()` that will **print** out the numbers from 60 to 48 backwards all on one line with the help of only one variable. Print the messages "Starting" and "Done" before and after the line of numbers. Test the function from `main()`.

Sample output:

Starting

60 59 58 57 56 55 54 ... .. 48

Done

**Task 2****[10]**

Write a function `"print_pyramid(...)"` which takes a single integer argument height and displays a *"pyramid"* of this height made up of `"*"` characters on the screen. Test the function with a simple *"driver"* program, which should be able to reproduce the following example output:

This program prints a 'pyramid' shape of a specified height on the screen.

How high would you like the pyramid? 37

Pick another height (must be between 1 and 30): 6

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

**Task 3****[10]**

Write a function which takes a single integer parameter, and determines whether it's an even or an odd number. The return type of function should be **boolean**.

**Task 4****[15]**

Suppose after completing your degree you have been appointed as a programmer at the state of Bella in United Kingdom. The basic currency unit at Bella is coin and the coinage is the quantity of money. The finance minister of Bella has asked you to develop software with following requirements.

1. The program consists of a module that will **reads** in total number of coins.
2. The programs consist of another module that accepts money as **input** and convert it into Thousands, Hundreds, Fifties, Tens and Fives.
3. The third module must **display** the total number of thousands, hundreds, fifties, tens and fives.

**Task 5****[15]**

Write a function `"estimateCost(...)"` to gauge the **expected cost** of an item in a specified number of years. The program asks for the cost of the item, the number of years from now that the item will be purchased, the rate of inflation and make a call to `"estimateCost(...)"` which will **estimate** and **return** the cost of the item after the specified period. If user enters the inflation rate as a percentage like 5.6 (%), your program should then convert the percent to a fraction such as 0.056 and estimate the price adjusted for inflation. Test the functionality of your module from `main()`.

Inputs:

price today's price of the item

years number of years from now that the item will be purchased

inflation the rate of inflation (need to convert to decimal form)

Output:

price of the item in that many years

**Task 6****[20]**

In mathematics, the **factorial** of a positive integer  $n$ , denoted by  $n!$ , is the product of all positive integers less than or equal to  $n$ . For example,  $5! = 1 \times 2 \times 3 \times 4 \times 5 = 120$ .  $0!$  is a special case that is explicitly defined to be 1.

So write a function `"caluclateFactorial(int)"` that inputs a positive integer, **computes** and **return** its factorial. Your program should place a **proper check** if user entered a **negative number**. After each calculation, the program should ask the user either he/she wants to continue or not, the program should continue its execution unless user entered **-1**. Test the functionality of your module from `main()`.

**Task 7****[20]**

Write a function that will print **Fibonacci series** up to  $n$  number, the  $n$  is entered by a user and passed to a function as an argument. By definition, the first two Fibonacci numbers are 0 and 1, and each remaining number is the sum of the previous two.

$$F_n = F_{n-1} + F_{n-2}$$

The Fibonacci series is 0, 1, 1, 2, 3, 5, 8, 13, 21...

---

☺ ☺ ☺ **BEST OF LUCK** ☺ ☺ ☺

---