Indian Institute of Technology Bombay, Mumbai
Department of CSE, Kanwal Rekhi Building
CS101 – Computer Programming
Autumn Semester 2014-2015

Special Makeup Lab 2 – Handout
Wednesday, 22 October 2014

General Instructions: *Please read the instructions carefully before proceeding further.*

Read the entire lab handout carefully and understand it.
This lab requires you to **download, execute, and submit** one program today before you leave the lab.

The code snippet (splab2.cpp) is uploaded under **'Special Lab'** on course page on http://www.cse.iitb.ac.in/~cs101/labs.html

I. **Download this splab2.cpp** file: Right click on **splab2.cpp** – > click '**Save link as**' – > Go to the desired directory and click '**Save**'.
II. Load this .cpp in Code::Blocks
III. Fill up the necessary blocks of the code
IV. Compile and execute the splab2.cpp file
V. Submit **only a single file** (splab2**.cpp**). The instructions for submitting/uploading a file are given below:

Goto http://www.cse.iitb.ac.in/~cs101

1. Click on '**Lab Assignment Submission**' link.
2. Write your roll number in the text box.
3. Enter your CC (Computer Centre) LDAP password for authentication purposes
4. Click the '**Choose File**' button.
5. Browse through your directory by navigating to the folder in which you have created the project. Select the program i.e. '.cpp' file, from your project directory.
6. Click the '**Submit**' button.
7. A new page will open with the message '**Upload Successful. Click here to go back**'
8. Perform these steps (1 to 7) for all the programs that you have written.

VI. Please note that your IP address is being logged. So, only the lab assignment submissions made from the lab will be evaluated. **Submissions made from the hostel or outside the lab will NOT be considered.**
VII. Since the .cpp file that you submit will be evaluated using an auto-grader, **DO NOT** write any cout statements, else your code **may not pass the auto-grader checks**

Note: Copying code from others amounts to violation of the honor code, and if detected, will lead to severe penalties, which could include award of the FR grade.

Objective: In this lab, you are required to solve practice problems based on conditional execution

Programs to be Submitted Online

The program splab2.cpp has 3 blocks of code that needs to be filled up. The first is Q1, second is Q2, and third is Q3 (Bonus Question and optional).

For Q1, you need to fill in the code within the BEGIN and END statement of the first empty block, which is 'DONT_ERASE_02_01'

For Q2, you need to fill in the code within the BEGIN and END statement of the second empty block, which is 'DONT_ERASE_03_01'

For Q3, you need to fill in the code within the BEGIN and END statement with a 'BONUS' tag of the third block, which is 'DONT_ERASE_04_01'

Take help of your TA if you have difficulty in indentifying the blocks of code.

Question 1
In the first block of code, you are expected to write a function '**sumSquaresDigits**()'. The function has an integer number '**sqdNumber**' as a parameter. In this function you are required to find the sum of the squares of the digits of the number '**sqdNumber**'. This value should be returned to the main function from where it was called.

Function Prototype:
int sumSquaresDigits(int sqdNumber)

E.g. if the variable '**sqdNumber**' contains 245, which is passed from the main function, the function should do the following
Calculate answer = $2^2 + 4^2 + 5^2$
Return this answer to the main function

Question 2
Consider a number of '**n**' digits. An armstrong number is a number which is equal to the sum of the '**nth power**' of the individual digits.

Consider the number 153. It has 3 digits. It is an armstrong number because,
$153 = 1^3 + 5^3 + 3^3$
Consider another example where the number is 1634. Here, the number of digits is 4. Hence the power is 4. This is an armstrong number becaue,
$1634 = 1^4 + 6^4 + 3^4 + 4^4$

You are required to write a function '**checkArmstrong**' to check whether the number '**int armNumber**' passed as a parameter to this function is an armstrong number or not. The function '**checkArmstrong**' should return boolean value 0 if it is an armstrong number, else it should return boolean value 1.

Function Prototype
bool checkArmstrong(int armNumber)

E.g. If the variable '**armNumber**' contains 153, the function should return 0 as it is an armstrong number.

Question 3 – Bonus Question (Optional)
You are required to write a function '**decimalToBinary()**' that has '**int decimalNumber**' as a parameter. The function should convert the number into binary and return the binary number to the main function.

Function Prototype
int decimalToBinary(int decimalNumber)

E.g.
If the variable '**decimalNumber**' contains value 7, then the function should return value '**111**' to the main function.

Practice Programs (Not to be Submitted)

1) Write a program that takes a number as input from the user and calcuates and prints the factorial of that number.

2) Write a program that accepts a number from the user and prints Hemchandra Number Series till that number. The series is given below:
0 1 1 2 3 5 8 13 21 .....
If the user enters the number as 9, then the hemchandra series that should be printed is:
0 1 1 2 3 5 8

3) Write a program that prints a conversion table from Centigrade to Fahrenheit, say between 0^{o}C to 100^{o}C. Write using while and also using for.

4) Write a program that prints out the digits of a number starting with the least significant digit, going on to the most significant. Note that the least significant digit of a number n is simply n % 10.

5) A natural number is said to be a palindrome if the sequence its digits is the same whether read left to right or right to left. Write a program to determine if a given number is a palindrome.

6) Write a program that takes a number as input from the user and prints its multiplication tables uptill 10 numbers in the format given below. E.g. If number 5 is entered, the program should print the following

```
5 *  1 =  5
5 *  2 = 10
5 *  3 = 15
....
5 *  9 = 45
5 * 10 = 50
```