Department of Computer Engineering
Department of Software Engineering
CENG113 / SENG113 - Computer Programming 1
Fall 2021 - 2022

Lab Guide #7 – Week 8

OBJECTIVE : - Functions that return a value ,
- Functions with Output Parameters

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1. Write a function ***calculate*** that receives the number of credits and the class of a student to compute and return the tuition of the student for that semester, according to the below criteria;

- If a student is taking 12 credits or less, the tuition is $525 per credit. If a student is taking more than 12 credits, the tuition is $4500 plus $750 per each credit above 12 credits.
- The 4th year students will be given 0.15 discount.

Write a main program to input student id, credits and the class (1, 2, 3, and 4) for a set of students and output the id and tuition of each student using the above criteria. The program will stop when -1 is given as a student id.

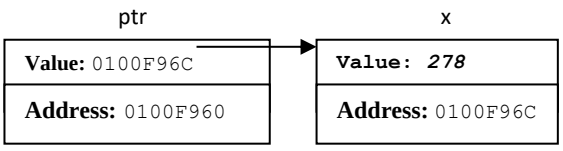
Project Name: LabGuide7_1
File Name: Question_1.cpp

Example Run:

```
Enter the student id (-1 to exit): 9989
Enter the credit: 4
Enter year: 1
Student with id 9989 will pay tuition 2100$

Enter the student id (-1 to exit): 9966
Enter the credit: 15
Enter year: 3
Student with id 9966 will pay tuition 6750$

Enter the student id (-1 to exit): 8888
Enter the credit: 15
Enter year: 4
Student with id 8888 will pay tuition 5738$

Enter the student id (-1 to exit): -1
```

2. Fill in the blanks in the following C program using the given addresses and contents of ptr and x variables. Then, write and execute it on the computer. Is there any difference in the output? Why?

Project Name: LabGuide7_2
File Name: Question_2.cpp




```
#include <stdio.h>


int main (void)
{
  int x = 278;
  int *ptr;

  ptr=&x;

  printf ("\n1. Value of the variable x by using x is: %d", _________);
  printf ("\n2. Value of the variable x by using ptr is: %d", _________);

  printf ("\n\n1. Address of the variable x by using x is: %p", _________);
  printf ("\n2. Address of the variable x by using ptr is: %p", _________);

  printf ("\n\n1. Address of the pointer ptr by using ptr is: %p", _________);

  printf ("\n\n1. Value of the pointer ptr by using ptr is: %p", _________);

  *ptr=350;

  printf ("\n1. Value of the variable x by using x is: %d", _________);
  printf ("\n2. Value of the variable x by using ptr is: %d", _________);

  return(0);
}
```

3. **a)** Write a function that gets a double number, and returns its integer and fractional parts. (E.g; if it gets 2.54, it returns 2 and 0.54)

b) Write a function that gets an integer and a fractional number. If fractional number is greater than or equal to 0.5, function returns integer number plus one. Otherwise, it returns the integer number.

c) Write a program that reads double numbers from the user, then rounds all **5** numbers using the functions you wrote in part a and part b and gives output to console.

Example Run:

```
Enter 1. number: 15.62

integer part   : 15, fractional part: 0.6200
rounded number : 16
*******************************************
Enter 2. number: 132.114

integer part   : 132, fractional part: 0.1140
rounded number : 132
*******************************************
Enter 3. number: 569.1456987

integer part   : 569, fractional part: 0.1457
rounded number : 569
*******************************************
Enter 4. number: 145.69877

integer part   : 145, fractional part: 0.6988
rounded number : 146
*******************************************
Enter 5. number: 4789.987

integer part   : 4789, fractional part: 0.9870
rounded number : 4790
*******************************************
```

Project Name: LabGuide7_3
File Name: Question_3.cpp

4. Write the function **`decimalValue`** which converts a number in a base smaller than 10 to its decimal value. The function takes the base and the number as input parameter and returns its decimal.

```
int decimalValue(int base, int number)
```

Write a main program to input base and the number, display the decimal equivalent using the function above.

Project Name: LabGuide7_4
File Name: Question_4.cpp

Example Run #1:

```
Enter the base: 2
Enter the number: 1011

Decimal value of the number 1011 in base 2 is 11.
```

Example Run #2:

```
Enter the base: 9
Enter the number: 362

Decimal value of the number 362 in base 9 is 299.
```

5.

- Write a function named **drawTriangle()** that draws the following triangle using nested loops.

```
    1
   2 2
  3   3
 4     4
543212345
```

- Write a function named **drawRhombus()** that draws the following rhombus using nested loops.

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

- Write a function named **menu()** that displays a menu with the following options.

```
1. Draw a triangle
2. Draw a rhombus
3. Exit
```

Write a C program that displays a menu, validates user input according to the choice, and draws a shape as in the example run, by using the above functions.

Project Name: LabGuide7_5
File Name: Question5.cpp

Example Run:

```
MENU
1. Draw a triangle
2. Draw a rhombus
3. Exit

Enter your choice: 1

    1
   2 2
  3   3
 4     4
543212345

MENU
1. Draw a triangle
2. Draw a rhombus
3. Exit

Enter your choice: 2
    1
   2 2
  3   3
 4     4
5       5
 6     6
  7   7
   8 8
    9

MENU
1. Draw a triangle
2. Draw a rhombus
3. Exit

Enter your choice: 3
```

6.

In the kids' game "Paper, Rock, Scissors" each player chooses one of the three and the winner is determined by the relationship between the two choices. "Paper covers rock" so paper wins; "rock breaks scissors" so rock wins; and "scissors cuts paper" so scissors wins. If the both choose the same, it is a tie and no one wins.

Write the function **machineChoice**() that randomly generates a number (0, 1, 2) and returns a character (p, r, s) according to the number. Examine the following table:

Random Number	Character to be returned
0	p
1	r
2	s

Write a C program to play the game against the computer until the player enters **q** instead of a choice.

Project Name: LabGuide10_6
File Name: Question6.cpp

Example Run:

```
Choose (p)aper, (r)ock, (s)cissors or (q)uit: p
it's a tie! Your score: 0

Choose (p)aper, (r)ock, (s)cissors or (q)uit: s
The machine chooses paper. Scissors cuts Paper. You Win! Your score: 1

Choose (p)aper, (r)ock, (s)cissors or (q)uit: r
The machine chooses scissors. Rock breaks Scissors. You Win! Your score: 2

Choose (p)aper, (r)ock, (s)cissors or (q)uit: r
The machine chooses paper. Paper covers Rock. You Lose! Your score: 1

Choose (p)aper, (r)ock, (s)cissors or (q)uit: s
The machine chooses rock. Rock breaks Scissors. You Lose! Your score: 0

Choose (p)aper, (r)ock, (s)cissors or (q)uit: p
it's a tie! Your score: 0

Choose (p)aper, (r)ock, (s)cissors or (q)uit: r
The machine chooses scissors. Rock breaks Scissors. You Win! Your score: 1

Choose (p)aper, (r)ock, (s)cissors or (q)uit: q
```