CYPRUS INTERNATIONAL UNIVERSITY
FACULTY OF ENGINEERING
CMPE112, CPE 112, CTPR112, ITEC112, MISY112, IT112, COMP112
Lab Exercises

Chapter 4: loops, iteration and nested loops
Chapter 5: pre-defined functions / user-defined functions

Please solve the following questions via C/C++ programming.
You can use any IDE you like.

The Dev C++ is available for PC and can be downloaded at:
http://www.bloodshed.net/devcpp.html

The CodeBlocks is a Linux friendly IDE and is available at:
http://www.codeblocks.org/

XCode is Mac development environment for free and can be downloaded at:
https://developer.apple.com/xcode/

Pre-Defined Functions – Mathematical Functions And Standard Library Functions

1- Write a complete C++ program that gets a value and b value from the user. According to entered values, calculate and display the output of x.

$$x = a^b$$

```
Please enter a value to a: 5
Please enter a value to b: 6
x is: 15625
```

2- Write a complete C++ program that asks to user to enter a value of a value and b value. According to the entered values, calculate the given formula and display the output on the screen.

$$y = \sqrt{a^2 + b^3}$$

```
Please enter a value to a: 5
Please enter a value to b: 4
The square root of the 89 is: 9.43398
```

3- Write a complete C++ program that asks to user to enter a value of w, x, y, z. By using given values calculate the given formula and display the output on the screen.

Hint: (e means exponential)

$$a = \sqrt{w^x + y^2 + e^z}$$

```
Please enter the value of w: 5
Please enter the value of x: 4
Please enter the value of y: 2
Please enter the value of z: 2
Result is: 25.2268
```

4- Write a complete C++ program that gets the value of x from user then calculates the given formula and display the output on the screen.

Hint: (ln means natural logarithm)

$$z = e^2 + 2ln(x) - x$$

```
Please enter the value of x: 4
Result is: 6.16164
```

5- Write a complete C++ program that gets the value of x, y and z from user then calculates the given formula and display the output on the screen.

Hint: (log means base logarithm)

$$f = \frac{2x + 10y}{log(z)}$$

```
Please enter value of x: 2
Please enter value of y: 4
Please enter value of z: 6
Result is: 55.4039
```

6- Write a complete C++ program that gets the value of b and x from the user and calculates the given formula. As a result program should display the absolute value of the result.

$$v = -1\frac{2^b + e^4}{ln(x) + log(5)}$$

```
Please enter value of b: 5
Please enter value of x: 4
Result is: 41.5286
```

7- Write a complete C++ program that gets the value of a and b from the user and calculates the given formula.

a) Display the smallest integer which is bigger than result.
b) Display the biggest integer which is less than result.

$$n = \sqrt{\frac{e^{b}}{2log\left(e^{a}+b\right)}}$$

```
Please enter the value of a: 5
Please enter the value of b: 4

Result is: 3.53627
a) Smallest integer which is bigger than result is: 4
b) Biggest integer which is less than result is: 3
```

8- Write a complete C++ program that gets the value of "**a**" and "**b**" from the user and calculates the given formulas and find the remainder of **"formulas"** a/b as a floating point number.

Formula a)

$$m = 5 + 2log\left(a^{b}\right)$$

Formula b)

$$n = \frac{2}{log\left(e^{2}\right)}$$

```
Please enter the value of a: 5
Please enter the value of b: 10
The result of formula a is: 18.9794
The result of formula b is: 2.30259
The remainder as float is: 0.55872
```

9- Write a complete C++program that gets b, x and y from the user and calculates the given formulas.

You can create menu as follows.

```
1- Calculate sin
2- Calculate cos
3- Calculate tan
Please make your choice: 1
```

a) $$a = sin\left(x^{b} + \sqrt{b + y^{x}}\right)$$

```
Please enter the value of b: 5
Please enter the value of x: 4
Please enter the value of y: 2
The result of formula is: -0.958508
```

b) $$b = cos\left(y + \frac{e^{b}}{x + x^{5}}\right)$$

```
Please enter the value of b: 5
Please enter the value of x: 4
Please enter the value of y: 2
The result of formula is: 0.320106
```

c) $$c = tan\left(x + \frac{b + x^{y}}{x^{5} + e^{2}y}\right)$$

```
Please enter the value of b: 5
Please enter the value of x: 4
Please enter the value of y: 2
The result of formula is: -0.433889
```

10- Write a C++ program that calculates the given formula. According to result display the following messages.

Hint: "**a"** value must be generated random by program itself and it must be between 0 and 20.

$$r = a^2 + e^2$$

R ≥ 400	Wow! R value is very big
R ≥ 250 < 400	R value is bigger than I thought
R ≥ 100 < 250	R is not easy to guess
R ≥ 0 < 100	You can guess it man!

```
Generated number is: 18
R is : 331
R value is bigger than I thought
```

User Defined Functions

11- Write a C++ program that calculates the ages of the 10 students in the function called **"void totalAges()"** and displays the total.

```
Please enter student 1 age: 18
Please enter student 2 age: 18
Please enter student 3 age: 20
Please enter student 4 age: 20
Please enter student 5 age: 22
Please enter student 6 age: 22
Please enter student 7 age: 24
Please enter student 8 age: 24
Please enter student 9 age: 25
Please enter student 10 age: 25
The total is: 218
```

12- Write a C++ program that gets a number from user. According to given number program should calculate and display the multiplication table of given number as shown as below in the function **"void multiplicationTable()"**;

```
Please enter a number: 9
9 x 0 : 0
9 x 1 : 9
9 x 2 : 18
9 x 3 : 27
9 x 4 : 36
9 x 5 : 45
9 x 6 : 54
9 x 7 : 63
9 x 8 : 72
9 x 9 : 81
```

13- Write a C++ program that gets a character from user. According to given character program should send this character to the function and display the rest of the characters of alphabet in the function **"void showAlphabet(char character)".** If the given character is **"z or Z"** then program should display **"Z is the last character in the alphabet"**.

```
Please enter a character: b
Rest of the character(s) are: cdefghijklmnopqrstuvwxy
```

14- Write a C++ program that gets value of **x as base** and **y as exponent** from the user and calculates the power of the x and returns it as value from the function **"int raiseToPower(int base, int exponent)".**

Do not use any Pre-defined mathematical function create your own to calculate.

```
Please enter the base value: 2
Please enter the exponent value: 4
The power of 2 by 4 is: 16
```

15- Write a C++ program that gets value of x, y and z from the user. According to given numbers find the maximum number in the function **"int maximumNumber(int a, int b, int c)"** and return it.

```
Please enter value of x: 5
Please enter value of y: 2
Please enter value of z: 4
Maximum number is: 5
```

16- Write a C++ program that gets the value of x and y. Then the application should show the menu as given below to the user. To calculate each of these formulas, design and develop a different function.

Menu	Function Type And Name	Formula
1- To call calculateExponent	float calculateExponent(int x, int y)	$f = e^x + y$
2- To call calculatePower	int calculatePower(int x, int y)	$f = x^y + x + y^2$
3- To call calculateAbsolute	float calculateAbsolute(int x, int y)	$f = -y^2 + x$
4- To call calculateSquareRoot	float calculateSquareRoot(int x, int y)	$f = \sqrt{x + y^2}$

```
Please enter value of x: 5
Please enter value of y: 4

1- To call calculateExponent
2- To call calculatePower
3- To call calculateAbsolute
4- To call calculateSquareRoot
Please enter your choice: 1

The result is: 153.413
```

17- Assume that in a company employees getting paid **"20$"** for each hour. Write a complete C++ program that ask 10 workers how much they paid last month and calculates total money that company paid. Then show the menu as given to the user. For each menu option write a different function.

1- Calculate total hours that employees worked	int totalHours(int totalMoney)
2- Calculate average salary of employees	float average(int totalMoney)