Department of Information Systems and Technologies

CTIS151 – Introduction to Programming

Spring 2023 - 2024

Lab Guide #3 – Week 4 - 1

OBJECTIVES : Data Types, Constants, Arithmetic Operations, Formatting Output
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Q1. Below is a C code for a program that was created to calculate the thermal energy needed to raise the temperature of an object to a certain degree. However, there is a number of errors in the given code below.

Write your corrected code into Visual Studio and try to execute it. Observe if any errors exist, try to correct these errors and check again until the program is successful.

```
#define _CRT_SECURE_NO_WARNINGS
include <studio.h>

#define SPECIFIC_HEAT 703

int main(void)
{
      // Declare variables
       int currentTemperature, 2desiredTemperature;
       double thermal Energy, mass;

       // Get current temperature from the user
       printf("Please enter the current temperature in Celsius: );
       scanf("%c", currentTemperature);

       printf("Please enter the desired temperature in Celsius:" );
       scanf("%d", &2desiredTemperature);

       / Get the mass from the user
       printf("Please enter the mass in Kilograms: ");
       scanf("lf", &mass);

       // Calculate the thermal energy
       thermalEnergy = mass * SPECIFIC_HEAT * (2desiredTemperature -
   currentTemperature;

       // Output results
       printf("The energy needed to raise the temperature of a %f kg object %d
   degrees is %f J", &mass, desiredTemperature - currentTemperature, thermalEnergy);

    return 0;

}
```

Your final example output should look like the one below.

Example Run:

```
Please enter the current temperature in Celsius:5
Please enter the desired temperature in Celsius:15
Please enter the mass in Kilograms: 7.5
The energy needed to raise the temperature of a 7.500000 kg object 10 degrees is 52725.000000 J
```

Project Name: LG3_Q1
File Name: Q1.cpp

Q2. Write a C program that gets the km distance between two different cities and also gets the km speed from the user. Program calculates the time of arrival.

Example Run #1:

```
Enter the km distance between first city and second city: 536
Enter your speed: 100
You can reach 5 hours totally
```

Example Run #2:

```
Enter the km distance between first city and second city: 845
Enter your speed: 120
You can reach 7 hours totally
```

Project Name: LG3_Q2
File Name: Q2.cpp

Q3. Write a C program that gets a decimal number (3 digits for the integral part and 5 digits for the fractional part) from the user and displays the value in the format shown in the example run.

Example Run:

```
Enter a number (3 digits integer and 5 digits fractional): 627.7248

628
627.72
627.72480000
   627.72
627.7248000
 627.725
   628
```

Project Name: LG3_Q3
File Name: Q3.cpp

Q4. Write a C program that gets the lowercase and uppercase forms of any letter, to display their corresponding ASCII codes as well as the difference between their codes, as shown in the example run.

Note that: *Check the difference of the same letter. (e.g.: 'a' - 'A') What is the important point related to this difference?*

Example Run #1:

```
Enter the lowercase form of any letter: g
Enter the UPPERCASE form of any letter: G

ASCII code of lowercase form 103.
ASCII code of UPPERCASE form 71.

Difference between the codes is 32.
```

Example Run #2:

```
Enter the lowercase form of any letter: s
Enter the UPPERCASE form of any letter: S

ASCII code of lowercase form 115.
ASCII code of UPPERCASE form 83.

Difference between the codes is 32.
```

Project Name: LG3_Q4
File Name: Q4.cpp

Q5. Write a C program that computes the mathematical equation with the initial values for each variable given to you below.
Note: *Test yourselves for if you can use the least amount of parenthesis with the correct result. The minimum possible for this question is 5 parentheses.*

x = 2 y = 3 z = 4.2 t = 4 w = 1.8

$$result = x - \frac{z * \frac{y-w}{t}}{w - \frac{z*t}{w}}$$

Example Run:

```
The result of the equation is 2.17
```

Project Name: LG3_Q5
File Name: Q5.cpp

ADDITIONAL QUESTIONS

AQ1. A family wants to lay a carpet into their living room. The living room's shape is a rectangle. The price of the 1 square meter of the carpet is **50** TL. Also the carpet seller wants **250** TL extra for laying down the carpet into the living room. Write a C program that gets first the sides of the rectangle from the user, and calculates and displays both the area of the living room and the total money to be paid to the carpet seller. (**Define constants where necessary**.)

Example Run:

```
Enter first side of living room: 6.15
Enter second side of living room: 8.24

The area of the living room is 50.68 square meters.
The total price to be paid is 2783.80 TL
```

Project Name: LG3_AQ1
File Name: AQ1.cpp

AQ2. Write a C Program that calculates the following operation with given variables below and displays the result. The variables will be initialized. (Try to use minimum number of parenthesis.) (a = 5.6, b = 4, c = 12, d = 5.2, e = 9).

***Hint**: a and d are double, others are int. **Hint**: Use math.h*

$$\frac{|d-c|}{a+\dfrac{b+a^3}{2+\dfrac{\sqrt[4]{c}}{e+\dfrac{\sqrt{b+c}}{c+\dfrac{e^2}{5}}}}}$$

Example Run:

```
Result is 0.0781
```

Project Name: LG3_AQ2
File Name: AQ2.cpp

INSTRUCTIONS FOR UPLOADING YOUR ANSWERS:

1. **Make sure you have saved all your work** and exit from Microsoft Visual Studio.

2. Upon exit, if you hadn't saved already then Visual Studio will notify you to save it automatically; say **yes** to this.

3. Navigate into the directory in which you had created your lab guide solution and reverse click onto the **LG3_Sols** folder in there.

4. From the options menu, hover your mouse cursor over the **7-Zip** option and select "**Add to LG3_Sols.zip**" option to archive and compress your solutions folder. Change the name of the resulting archive to your name and surname to the zip file, i.e. **NameSurname.zip**

5. Upload the zip file to the instructor's PC by using your preferred browser;

   – **CTISL1: http://lab1t**

   – **CTISL2: http://lab2t**

   – **CTISL4: http://lab4t**

6. Inform your assistant that you have completed the upload process.

7. After your assistant's **approval**, delete your files using the "**Clean**" module you can either find in your start menu, the C: drive root folder or download through http://lab1t for Lab1 , http://lab2t for Lab2 and http://lab4t for Lab4.