Lab 1 Solution CSE 1310

Programming guidelines:

- Missing indentation: -5
- Missing comments in each program: -5
- Missing name, ID, lab 1: -5
- Missing Honor Code with signature/name: -20
- Missing best time to code Lab1 problems: -20
- Output not as shown in the question: 0

HONOR CODE

I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or that I contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

I will not engage in any form of cheating

- Include your best time to code a working solution for EACH of the problems in Lab 1. You will not be penalized if you take longer to code a problem. This part is simply to ensure that you are doing the needful to do well in the departmental final.
- You will get no additional points for indentation, comments, and including your name, id, and best coding time. However, you will lose points if you do not include these
- The deadline to submit this assignment is September 24,2020 by 11:59 PM.
- Please read the instructions carefully before you implement these.
- Please solve all these problems yourself without looking at anyone else's code. However, you may discuss the problems with each other.
- Before uploading the solutions, make sure you copy all your programs into a folder and compress the folder to a zip file.
- Please upload your solutions in a zip file named with your firstname_lastname_id.zip format as follows:

Contents of bhanu jain 1000xxxxx.zip

A folder that contains all the code files: Q1.c, Q2.c, ..., Q13.c

O1. For an equilateral triangle, its perimeter P can be calculated by its side length: $P = 3 \times I$: its

Q1. For an equilateral triangle, its perimeter P can be calculated by its side length: $P = 3 \times l$; its area A can be calculated as $A = 0.433 \times l \times l$. Write a program that:

- Defines a variable called "side" and sets its value to 3.
- Computes the perimeter of the triangle and stores it in a variable called "perimeter".
- Computes the area of the triangle and stores it in a variable called "area".
- Prints out the perimeter and the area of the triangle.

//output Q1

9.0

3.9

Q2. For a right triangle, its area A can be calculated by its two legs a and b: $A = a \times b / 2$; the square of its hypotenuse can be calculated as $c^2 = a^2 + b^2$ (= $a \times a + b \times b$). Write a program that:

- Defines a variable called "leg a" and sets its value to 3.
- Defines a variable called "leg b" and sets its value to 4.
- Computes the area of the triangle and stores it in a variable called "area".
- Computes the square of the hypotenuse and stores it in a variable called "c2".
- Prints out the area and the square of the hypotenuse.

6.0

25.0

Q3. The area of a trapezoid with two bases a and b and height h is (a + b) * h / 2. Write a program that:

- Defines a variable called "base a" and sets its value to 3.
- Defines a variable called "base b" and sets its value to 5.
- Defines a variable called "height" and sets its value to 4.
- Computes the area of the trapezoid and stores it in a variable called "area".
- Prints out the area.

//output Q3

16.0

Q4. According to Albert Einstein's famous "Theory of Special Relativity", the amount of energy an object can possess is determined by its relative mass and the speed of light; the relative mass of an object moving at high speed is increased. Given a spacecraft of static mass *m* moving at speed *v*, write a program that:

- Defines a variable "c" to store the speed of light (m/s) and sets its value to 300,000,000.
- Asks the user to enter the static mass m of the spacecraft (kg).
- Asks the user to enter the moving speed v of the spacecraft (m/s).
- Computes the relative mass of the spacecraft.
- Computes the energy that will be generated if the spacecraft completely explodes.
- Prints out the relative mass (kg) and the energy generated after explosion (J).

Hint: $m_{rel} = m / \operatorname{sqrt}(1 - v^2/c^2)$ $E = m_{rel} \times c^2$

To call sqrt() function, you'll need to include <math.h> header.

//output Q4

Please enter the mass of the spacecraft (kg): 1 000 000

Please enter the moving speed of the spacecraft (m/s): 200 000 000

1341640.8 kg

120747670784988634152960.0 J

Q5. Write a program that:

- Asks the user to enter a string.
- Asks the user to enter an integer.
- Prints out the length of the string, and the product of the length multiplied by the integer.

Hint: To call string functions, you'll need to include <string.h> header.

//output Q5

Please enter a string: Management

Please enter an integer: 6 The string has length 10. The product is 60.

Q6. Write a program that:

- Asks the user to enter a double number and stores it in a variable called "a".
- Asks the user to enter an integer and stores it in a variable called "b".
- Casts "a" into an integer and stores the integer in a variable called "a1".
- Prints out the calculation results of a1 + b, a1 b, a1 * b, and a1 / b.

//output Q6

Please enter a double number: 1.2

Please enter an integer: 3

The first number cast into an int becomes 1

Calculation results: 4 -2 3 0

Q7. Write a program that:

- Asks the user to enter a double number and stores it in a variable called "a".
- Rounds "a" and stores the value in an integer variable "ar".
- Floors "a" and stores the value in an integer variable "af".
- Prints out ar, af, and ar af.

Hint: You'll need to include <math.h> to call rounding, ceiling, and flooring functions.

Please enter a double number: 1.5

ar = 2, af = 1, ar - af = 1

Q8. Write a program that does the following:

- Asks the user to enter a string that contains at least five letters. It is OK if your program crashes when the entered string has length less than five.
- Asks the user to enter an integer and stores it in a variable called "n".
- Creates a variable called "first" and sets it equal to the first letter of the string.
- Prints out the next n-1 letters of the string.
- Prints out the rest of the string.

Hint: You know what's needed.

Please enter a string, at least 5 letters long: string

Please enter an integer: 3

The first letter is s.

The next letter is t

The next letter is r.

The rest of the string is ing.

Q9. Write a program that does the following:

- Asks the user to enter a string that contains at least five letters. It is OK if your program crashes when the entered string has length less than five.
- Stores the length into an integer variable called "l".
- Asks the user to enter an integer smaller than "l" and stores it in a variable called "n". It is OK if your program crashes when the entered number "n" is larger than "l".
- Creates a string variable called "ending".
- Sets "ending" equal to the last n letters of the string. Here you should think carefully how to do this, you may need more than one line of code to achieve this type.
- Prints out the value of "ending".

Hint: To figure out where the last n letters are, you need to know the length of the string.

Please enter a string, at least five letters long: Saturday Please enter an integer smaller than the string length: 3

The last 3 letters are: day.

Q10. Write a program that does the following:

- Asks the user to enter a string.
- Stores the length of the string in a variable called "length".
- If length is larger than four, prints out the string in upper case.
- If length is not larger than four, prints out the string in lower case.

Hint: You can use functions toupper() and tolower() from <ctype.h>.

//output Q10

Please enter a string: Mavericks Output string: MAVERICKS

OR

Please enter a string: Mavs

Output string: mavs

Q11. Write a program that does the following:

- Asks the user to enter a string.
- Asks the user to enter an integer "n".
- Prints out the string with the last n letters shown and the rest letters replaced by '\$' in the following format.

Hint: You can use functions memset() from <string.h>.

//output Q11

Please enter a string: MyPassword

Please enter an integer n: 4 Output string: \$\$\$\$\$word

Q12. Write a program that does the following:

- Asks the user to enter an integer, a string, and a double number, and saves them as variables called "number", "goods", and "price".
- Prints them out like this: "number goods for \$price".
- Only two decimal digits should be displayed for "price".

//output Q12

Please enter the number: 2 Please enter the goods: apples Please enter the price: 4.99

2 apples for \$4.99

Q13. A king wanted to put some wheat on an 8x8 chess board. He put one grain on the first square, two on the second, four on the third, eight on the fourth and so on. Write a program that does the following:

- Defines an integer variable "p" and assign it to 2.
- Defines an integer variable "n" and asks the user to enter its value.
- Calculates how many grains would be put on the first "n" squares and prints out the result.
- It is OK if the result is shown as a negative number when "n" is too large.

//output Q13

Please enter the square number: 20

1048575 gains would be put on the first 20 squares.