The University of Saskatchewan

Saskatoon, Canada

Department of Computer Science

CMPT 214– Programming Principles and Practice

Assignment 2

Date Due: September 28, 2020

Total Marks: 12

Submission Instructions

- Assignments must be submitted using Canvas.
- Programs must be written in C conforming to the C11 standard.
- No late assignments will be accepted. See the course syllabus for the full late assignment policy for this class.
- **VERY IMPORTANT**: Canvas is very fragile when it comes to submitting multiple files. We insist that you package all of the files for all questions for the entire assignment into a **ZIP** archive file. This can be done with a feature built into the Windows explorer (Windows), or with the **zip terminal command** (LINUX and Mac). We **cannot accept** any other archive formats. This means no tar, no gzip, no 7zip. Non-zip archives will not be graded. We will not grade assignments if these submission instructions are not followed.
- Instructions on "how to create zip archives" can be found here `https://canvas.usask.ca/courses/9771/pages/how-to-zip-slash-compress-your-files`

Question 1 (3 points):

Purpose: To practice use of conditionals/loops.

In the famous story of "Ali Baba and the Forty Thieves" in Antoine Galland's version of One Thousand and One Nights, "Open Sesame" is a magical word to open the mouth of a cave in which forty thieves have hidden a treasure.

Imagine that you are into a treasure hunting game where you need to find the door and enter your secret code. Your code is not "Open Sesame" but the "reverse of the number you entered". For example, if you enter 123456, the secret code will be 654321. Your task is to write a program to do the following:

- Get a six digit number as console input from the user as an integer type.
- Get the reverse of the number entered (your secret code)
- Print the secret code

Hints

- The right-most digit of an integer can be obtain through appropriate use of the modulus (%) operator.
- The digits of an integer can be shifted right (or left) by dividing (multiplying) by ten.
- If the number entered by the user has trailing zeros, you do not need to print leading zeros in the secret code (but you can if you want to – it just makes the problem harder). e.g if the number entered by the user is 456700, an acceptable answer for the secret code would be 7654.
- Moreover, you can assume that the number entered by the user does not have leading zeros, i.e. that the first digit is not zero.

Sample Output

```
The number entered by the user: 123456
The secret code to open the door: 654321
```

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Question 2 (4 points):

Purpose: To practice conditionals and functions.

James is selected as the team leader for the high school science fair. The project is to learn about Water Ecosystems and explore some of the interrelationships between the plants and animals in an environment. James and his teammates are ready with all materials and plan. But they need help with building a pond for their fishes and plants. The only condition is that the pond should be in a triangle shape. Your task is to guide James with perfect measurements for the sides of the pond.

Write a program for James to check the pond side values are valid for a triangle. By the fundamental rules of geometry, every side of a triangle must be shorter than the sum of the lengths of the other two sides. In other words, if x, y and z are three sides of a triangle, then the triangle is valid only if all three of these inequalities are satisfied:

$$\begin{aligned} x + y &> z \\ x + z &> y \\ y + z &> x \end{aligned}$$

Your task is,

(a) Read the side lengths x, y, and z from the console.

(b) Write a function that accepts x, y and z as parameters, and checks whether a triangle with these side lengths is possible (i.e. valid). The function should return 1 if the triangle is valid, and 0 otherwise.

(c) Call your function from part (b) in `main()` and print a message indicating whether the triangle with the entered lengths is valid or not.

Question 3 (5 points):

Purpose: To practice the use of Functions.

Generalize Assignment 1 question 3 by writing a function that calculates the profit that can be realized from the purchase of n chicks that are later sold as full-grown chickens. In this version, the expenses, required profits, and selling price will not be fixed, but instead may be arbitrary.

To remind you, the equation to compute n while taking into account 5% chickens lost is:

$$n = (p + f)/(0.95 * u - e)$$

Your task is,

(a) Write a function for assignment that accepts parameters e, f, u and p and calculates and returns the smallest number of chicks that need to be purchased to realize a profit p.

(b) Write a function that accepts n and calculates and returns how many chicks did not survive.

(c) In the main() program, prompt the user to enter the values of e, f, u and p, then call the functions you wrote in part (a) and (b) to obtain n, and the number of lost chickens.

(d) Print out the results as in the last two lines of the sample output.

Hints

You may use the solution for assignment 1 question 3 as a starting point for this question which includes the expressions for calculating results using correct rounding.

Sample Output

```
Enter the total fixed one time costs, f:  50
Enter the expenses to raise one chicken, e:  4
Enter the unit price charged per chicken, u:  6
Enter the required profit, p:  500
The number of chickens that Mary bought to raise $500.00 is:  324
The number of chickens lost during the first 16 weeks was:  17
```

What to Hand In

Hand in a `.zip` **file archive** which contains the following files:

asn2q1.c: Your completed solution for question 1.

asn2q1output.txt The console output of your three runs for question 1.

asn2q3.c: Your completed solution for question 3.

asn2q3output.txt The console output of your three runs for question 3.

asn2q2.c: Your completed solution for question 2.

asn2q2output.txt The console output of your three runs for question 2.

VERY IMPORTANT: You **must** hand in a ZIP archive containing all of the above files. You may not use any other type of archive (this means no gzip, no 7zip, etc.), and you may not submit the files individually. We regret this necessary inconvenience but failure to follow these instructions may result in your assignment not being graded. We simply do not have the resources to handle special cases when we have so many students in the class. Instructions on "how to create zip archives" ca be found here `https://canvas.usask.ca/courses/9771/pages/how-to-zip-slash-compress-your-files`.

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