ECE 111 – SP 23: Introduction to C and C++ Programming
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Assignments 3 and 4

Total Points: 100**; and Deadline:** February/23/2023, 11:59 PM.

Note – Cheating and Plagiarism: Cheating and plagiarism are not permitted in any form and cause certain penalties. The instructor reserves the right to fail culprits.

Deliverable: All your responses to the assignment questions should be included in a single compressed file to be uploaded to the Gannon University (GU) – Blackboard Learn environment.

Important: Read the **Chapters 3 and 4** of your textbook, which are available in the GU – Blackboard Learn environment, **before** working on your assignments.

Assignments 3: Input/Output

Question 1 (15 pts.). A movie in a local theater is in great demand. To help a local charity, the theater owner has decided to donate to the charity a portion of the gross amount generated from the movie. Write a program **with comprehensive explanation** that prompts the user to input the movie name, adult ticket price, child ticket price, number of adult tickets sold, number of child tickets sold, and percentage of the gross amount to be donated to the charity. The output of the program is as follows.

```
-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
Movie Name: ..................... Journey to Mars
Number of Tickets Sold: ........... 2650
Gross Amount: ..................... $ 9150.00
Percentage of Gross Amount Donated: 10.00%
Amount Donated: ................... $ 915.00
Net Sale: ......................... $ 8235.00
```

Note that the strings, such as "***Movie Name:***", in the first column are left-justified, the numbers in the right column are right-justified, and the decimal numbers are output with two decimal places.

`Input:` The input to the program consists of the movie name, adult ticket price, child ticket price, number of adult tickets sold, number of child tickets sold, and percentage of the gross amount to be donated to the charity.
`Output:` The output is as shown above.

Question 2 (15 pts.). Write a program **with comprehensive explanation** that reads a student name followed by five test scores. The program should output the student's name, the five test scores, and the average test score. Output the average test score with two decimal places. The data to be read is stored in a file called **`test.txt`**. The output should be stored in a file called, **`testavg.out`**.

`Input:` A file containing the student's name and the five test scores. A sample input is:
`Andrew Miller 87.50 89 65.75 37 98.50`
`Output:` The student's name, the five test scores, and the average of the five test scores, saved to a file.

Question 3 (20 pts.). A size of a jumbo candy bar with rectangular shape is `l × w × h`. Due to rising costs of coca, the volume of the candy bar is to be reduced by `p%`. To accomplish this, the management decided to keep the thickness, `h`, of the candy bar the same, and reduce the length and width by the same amount. For example, if `l = 12`, `w = 7`, `h = 3`, and `p = 10`, then the new dimension of the candy bar is `11.39 × 6.64 × 3`. Write a program **with comprehensive explanation** to accomplish this.

Assignments 4: Control Structures I (Selection)

Question 1 (15 pts.). Write a program **with comprehensive explanation** that calculates a customer's bill for a local cable company. There are two types of customers: residential and business. There are two rates for calculating a cable bill: one for residential customers and one for business customers. For residential customers, the following rates apply:

- Bill processing fee: $4.50
- Basic service fee: $20.50
- Premium channels: $7.50 per channel

For business customers, the following rates apply:

- Bill processing fee: $15.00
- Basic service fee: $75.00 for first 10 connections, $5.00 for each additional connection
- Premium channels: $50.00 per channel for any number of connections

The program should ask the user for an account number (an integer) and a customer code. Assume that `R` or `r` stands for a residential customer, and `B` or `b` stands for a business customer.

`Input:` The customer's account number, customer code, number of premium channels to which the user subscribes, and, in the case of business customers, number of basic service connections.
`Output:` Customer's account number and the billing amount.

Question 2 (15 pts.). Write a program **with comprehensive explanation** that prompts the user to input three numbers. The program should then output the numbers in ascending order.

Question 3 (20 pts.). In a right triangle, the square of the length of one side is equal to the sum of the squares of the lengths of the other two sides. Write a program **with comprehensive explanation** that prompts the user to enter the lengths of three sides of a triangle and then outputs a message indicating whether the triangle is a right triangle.