ECE 111 – SP 23: Introduction to C and C++ Programming
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Assignments 6 and 7

Total Points: 100**; and Deadline:** April/11/2023, 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 6 and 7** of your textbook, which is available in the GU – Blackboard Learn environment, **before** working on your assignments.

Assignments 6: User-Defined Functions

Question 1 (15 pts.). Write a program in C++ programming language **with brief explanation** that includes the following items.

   A. Voltage as a **function** of Current and Resistance.
   B. Current as a **function** of Voltage and Resistance.
   C. Power as a **function** of Current and Voltage.
   D. Power as a **function** of Voltage and Resistance.
   E. Power as a **function** of Current and Resistance.
   F. Inductive Reactance as a **function** of Frequency and Inductance.
   G. Capacitive Reactance as a **function** of Frequency and Capacitance.
   H. Resonant Frequency as a **function** of Inductance and Capacitance.

Refer to the following links for getting information about the relationships among parameters in **Electrical Circuits**.

   ▪ [DC Circuit Equations and Laws | Useful Equations And Conversion Factors | Electronics Textbook (allaboutcircuits.com)](#)
   ▪ [AC Circuit Equations | Useful Equations And Conversion Factors | Electronics Textbook (allaboutcircuits.com)](#)

Question 2 (15 pts.). Provide a short answer (i.e., no more than five lines on average with the font size of 12) on how **a software function** can lead to ethical issues in professional settings.

Refer to the following links for getting information about this subject.

   ▪ [ProfessionalAndEthicalDilemmasInSWEngineering.pdf (jmu.edu)](#)
   ▪ [How to Handle Ethics Issues in Software Development - HyperionDev Blog](#)
   ▪ [Ethics in computer software design and development (usda.gov)](#)
   ▪ [Everything to Know About Software Engineering Ethics | Fellow.app](#)
   ▪ [Ethics in Software Engineering | LinkedIn](#)
   ▪ [5 examples of ethical issues in software development | TechTarget](#)

Question 3 (20 pts.). Write a function, `reverseDigit`, that takes an integer as a parameter and returns the number with its digits reversed. For example, the value of `reverseDigit(12345)` is 54321; the value of `reverseDigit(5600)` is 65; the value of `reverseDigit(7008)` is 8007; and the value of `reverseDigit(-532)` is -235.

Assignments 7: User-Defined Simple Data Types, Namespaces, and the string Type

Question 1 (15 pts.). Children often play the game of rock, paper, and scissors. This game has two players, each of whom chooses one of the three objects: rock, paper, or scissors. If player 1 chooses rock and player 2 chooses paper, player 2 wins the game because paper covers the rock. The game is played according to the following rules:

- If both players choose the same object, this play is a tie.
- If one player chooses rock and the other chooses scissors, the player choosing the rock wins this play because the rock breaks the scissors.
- If one player chooses rock and the other chooses paper, the player choosing the paper wins this play because the paper covers the rock.
- If one player chooses scissors and the other chooses paper, the player choosing the scissors wins this play because the scissors cut the paper.

Write an interactive program that allows two people to play this game.

Input: This program has two types of input:
- The users' responses when asked to play the game.
- The players' choices.

Output: The players' choices and the winner of each play. After the game is over, the total number of plays and the number of times that each player won should be output as well.

Question 2 (15 pts.). Write a program that prompts the user to input a string. The program then uses the function `substr` to remove all the vowels from the string. For example, if `str = "There"`, then after removing all the vowels, `str ="Thr"`. After removing all the vowels, output the string. Your program must contain a function to remove all the vowels and a function to determine whether a character is a vowel.

Question 3 (20 pts.). Only for this question, **create a team of two/three members with your classmates** to strengthen your collaborative skills. In this regard, establish process for communication to follow through the agreed-upon roles and responsibilities to complete writing of a program in the C++ programming language. The program uses a random number generator to generate a two-digit positive integer and allows the user to perform the following operations. The team members must be specified in your response.

A. Double the number.
B. Reverse the digits of the number.
C. Raise the number to the power of 2, 3, or 4.
D. Sum the digits of the number.
E. If the number is a two-digit number, then raise the first digit to the power of the second digit.
F. If the number is a three-digit number and the last digit is less than or equal to 4, then raise the first two digits to the power of the last digit.

After performing an operation if the number is less than 10, add 10 to the number. Additionally, after each operation determine if the number is prime. Each successive operation should be performed on the number generated by the last operation. Your program should not contain any global variables and each of these operations must be implemented by a separate function. Also, your program should be menu driven.