COSC 501

Lab 3

(20 points) Program 1: Iteration Statement

Write a C++ program that prints the half pyramid of any character input from a user. The number of floors of pyramid is also determined by the user input. You need to use a nested loop.

Input: The number of floors, and a character for blocks of pyramid.

Sample Output: Red colored texts are user inputs. Other texts are the output of the program.

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Enter one character for the blocks of pyramid: *
Enter number of levels of pyramid: 10
*
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(40 points) Program 2: Iteration Statement

The game of "23" is a two-player game that begins with a pile of 23 toothpicks. Players take turns, withdrawing either 1, 2, or 3 toothpicks at a time. The player to withdraw the last toothpick loses the game. Write a human vs. computer program that plays "23". The human should always move first. When it is the computer's turn, it should play according to the following rules:

* If there are more than 4 toothpicks left, then the computer should withdraw 4 – X toothpicks, where X is the number of toothpicks the human withdrew on the previous turn.

* If there are 2 to 4 toothpicks left, then the computer should withdraw enough toothpicks to leave 1.

* If there is 1 toothpick left, then the computer has to take it and loses.

When the human player enters the number of toothpicks to withdraw, the program should perform input validation. Make sure that the entered number is between 1 and 3 and that the player is not trying to withdraw more toothpicks than exist in the pile.

Sample Output: Red colored texts are user inputs. Other texts are the output of the program.

Player: 3 (20 toothpicks left)
Computer: 1 (19 toothpicks left)

Player: 2 (17 toothpicks left)
Computer: 2 (15 toothpicks left)

Player: 1 (14 toothpicks left)
Computer: 3 (11 toothpicks left)

Player: 3 (8 toothpicks left)
Computer: 1 (7 toothpicks left)

Player: 3 (4 toothpicks left)
Computer: 3 (1 toothpick left)

Player: 1
Computer wins!

You are free to choose either version of this problem. Please know that you do not get extra credit for doing both!

(40 points) Program 3: Iteration Statement

Holy digits Batman! The Riddler is planning his next caper somewhere on Pennsylvania Avenue. In his usual sporting fashion, he has left the address in the form of a puzzle. The address on Pennsylvania Ave is a four-digit number where:

- All four digits are different
- The digit in the thousands place is three times the digit in the tens place
- The number is odd
- The sum of the digits is 27

Write a program that inputs a 4-digit number and determines whether it's the address where the Riddler plans to strike. Your program should allow the user to continue using your program by entering additional 4-digit numbers.

Sample Output:

Please enter a 4-digit number: 1234

Not a valid address – the number is even

Would you like to continue (Y/N)

Y

Please enter a 4-digit number: 1233

Not a valid address – the sum of digits is not 27

Would you like to continue (Y/N)

N

Good Bye!!

(40 points) Program 3: Iteration Statement (Harder Version)

Holy digits Batman! The Riddler is planning his next caper somewhere on Pennsylvania Avenue. In his usual sporting fashion, he has left the address in the form of a puzzle. The address on Pennsylvania Ave is a four-digit number where:

- All four digits are different
- The digit in the thousands place is three times the digit in the tens place
- The number is odd
- The sum of the digits is 27

Write a program that uses a loop (or loops) to find and display the address where the Riddler plans to strike.

Submission:

You should submit your source files (.cpp). Please name your files to include the lab number and program number. e.g. Lab0Program1.cpp. Also create a word or pdf document for the answers to the lab questions and screenshots of running result.