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//Cristian Castro
//Winning Number Analysis Implementation.cpp : This file contains the 'main' function. Program execution begins and ends there.

/*
 * This file is part of Cristian Castro's submissions.
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 *
 * Developed for the ITI-3310 Programming in C++ course.
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 */

/*This implementation gathers the most frequent numbers of the 'normal' numbers and the most frequent powerball numbers.
 * During the creation of this program, the data base was limited to all the extractions from the 7th of October 2015 and on.
 * For maximum efficiency, do not use extractions done before the date mentioned above.
 * This is because at that date there was a change in the range of the extractions, making all of the extractions up to that point invalid
 towards research.
 */

#include <iostream>
#include <fstream>
#include <vector>
#include <sstream>
#include <numeric>
#include <algorithm>

using namespace std;

//This method is for debugging purposes, it outputs the frequency of each number. The number itself is the index of the array at which the
correspondent frequency is stored at.
void tempOutput(int freq[70], int pbfreq[27])
{
    cout << "Numbers: " << "\n";
    for (int i = 0; i < 70; i++) {
        cout << freq[i] << "\n";
    }

    cout << "PowerBall: " << "\n";
    for (int i = 0; i < 27; i++) {
        cout << pbfreq[i] << "\n";
    }
}

/*Sums all of the elements in an array of size 6
 *
 * @param array of size 6
 * @return sum
 */
int sumArray(int tempNumRow[6]) {
    int sum = 0;
    for (int i = 0; i <= 6; i++) {
        sum = sum + tempNumRow[i];
    }
    return sum;
}

/*Prints to console the top 5 numbers not including the powerball number.
 *
 * @param array of number frequencies, size of array.
 */
void printTop5(int arr[], int arr_size) {
    int first, second, third, fourth, fifth;
    first = second = third = fourth = fifth = 0;

    for (int i = 0; i < arr_size; i++) {
        if (arr[i] > first)
        {
            fifth = fourth;
            fourth = third;
            third = second;
            second = first;
            first = arr[i];
        }

        else if (arr[i] > second && arr[i] != first)

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    {
        fifth = fourth;
        fourth = third;
        third = second;
        second = arr[i];
    }

    else if (arr[i] > third && arr[i] != second) {

        fifth = fourth;
        fourth = third;
        third = arr[i];
    }

    else if (arr[i] > fourth && arr[i] != third && arr[i] != second) {

        fifth = fourth;
        fourth = arr[i];
    }

    else if (arr[i] > fifth && arr[i] != fourth && arr[i] != third && arr[i] != second) {
        fifth = arr[i];
    }

}

cout << "The five most frequent numbers are: ";
for (int i = 0; i < 70; i++) {

    if (arr[i] == first) {
        cout << i << " ";
    }

    if (arr[i] == second) {
        cout << i << " ";
    }

    if (arr[i] == third) {
        cout << i << " ";
    }

    if (arr[i] == fourth) {
        cout << i << " ";
    }

    if (arr[i] == 4) {
        cout << i;
    }

}
cout << "\n";
}

/*Prints to console the top 5 powerball numbers.
*
* @param array of number frequencies, size of array.
*/
void printTop5PWBL(int arr[], int arr_size) {
    int first, second, third, fourth, fifth;
    first = second = third = fourth = fifth = 0;

    for (int i = 0; i < arr_size; i++) {

        if (arr[i] > first)
        {
            fifth = fourth;
            fourth = third;
            third = second;
            second = first;
            first = arr[i];
        }

        else if (arr[i] > second && arr[i] != first)
        {
            fifth = fourth;
            fourth = third;
            third = second;
            second = arr[i];
        }

        else if (arr[i] > third && arr[i] != second) {

            fifth = fourth;
            fourth = third;
            third = arr[i];
        }
    }
}

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        else if (arr[i] > fourth && arr[i] != third && arr[i] != second) {

            fifth = fourth;
            fourth = arr[i];
        }

        else if (arr[i] > fifth && arr[i] != fourth && arr[i] != third && arr[i] != second) {
            fifth = arr[i];
        }

    }

    cout << "The five most frequent powerball numbers are: ";
    for (int i = 0; i < 70; i++) {

        if (arr[i] == first) {
            cout << i << " ";
        }

        if (arr[i] == second) {
            cout << i << " ";
        }

        if (arr[i] == third) {
            cout << i << " ";
        }

        if (arr[i] == fourth) {
            cout << i << " ";
        }

        if (arr[i] == 4) {
            cout << i;
        }

    }
    cout << "\n";
}

int main()
{
    //File in
    fstream in("powerball.csv");

    int freq[70] = { };
    int pbfreq[27] = { };
    vector<string> temp;
    string number;
    string line;
    int counter = 0;

    // If file is not there, "File not found" message .
    if (in.fail()) return (cout << "File not found" << endl) && 0;

    if (in.good()) {
        while (getline(in, line))
        {
            temp.clear(); //Clears the temporary array for new line insertion
            stringstream str(line); //Creates stream from the line

            //Inserts every item of the line in the temporary array
            while (getline(str, number, ','))
                temp.push_back(number);

            int tempNumRow[6] = { };

            //The for loop starts at 4 to ignore "Powerball" and the date numbers; and it ends 6 values later to ignore the random
            number each row has at the end
            for (int i = 4, j = 0; i < 10; i++, j++) {

                tempNumRow[j] = stoi(temp[i]);

                if (i == 9)
                    pbfreq[tempNumRow[j]]++; //Adds 1 to the powerball frequency array in the correspondent place
                else
                    freq[tempNumRow[j]]++; //Adds 1 to the number frequency array in the correspondent place

                counter++;
            }
        } //END while getline
    } //END if(in.good())

    //tempOutput(freq, pbfreq);

    printTop5(freq, 70);
    printTop5PWBL(pbfreq, 27);
}

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return 0;
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//END main
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