Project #1 – Do you know your numbers?

Course	INFO-1156 Object-Oriented Programming in C++
Professor	Garth Santor, Janice Manning, and Lynn Koudsi
Assigned	Tuesday, January 19th, 2021
Due	Friday, February 5th, 2021 by 11:59 pm
Weight	6%

Project Description (v1.0.1)

Write a C17 (not C++) console application that determines what type of number, a number is, and different means of representing the number. You will need to determine whether or not the number is any of the following:

- An odd or even **number**.
- A triangular number (traditional starting point of one, not zero).
- A prime number, or composite number.
- A square number (traditional starting point of one, not zero).
- A power of two. (The **number** = 2^n, where n is some natural value).
- A factorial. (The number = $n!$, for some natural value of n).
- A Fibonacci number.
- A perfect, deficient, or abundant number.

Then print out the value of:

- The number's even parity bit. (Even parity bit is 1 if the sum of the binary digits is an odd number, '0' if the sum of the binary digits is an even number)
  Example: $42_{10} = 101010_2$ has a digit sum of 3 (odd). Parity bit is 1.
- The number of decimal (base 10) digits.
- If the number is *palindromic*. The same if the digits are reversed.
  Example: 404 is palindromic, 402 is not (because $402 \neq 204$)
- The number in binary (base 2).
- The number in decimal notation, but with thousands separators (,).
  Example: **123456789** would prints at **1,234,567,890**.

You must code your solution with the following restrictions:

- The source code, **must be C**, not C++.
- Must compile in Microsoft Visual C with /std:c17
- The input type must accept any 32-bit unsigned integer.
- Output messages should match the order and content of the demo program precisely.

Grading Criteria

Difficulty: **Normal** | **Moderate** | **Difficult**

Functional Requirements		
Prompt shows maximum input value.	**2%**	
Input detects and reports non-numeric input.	**3%**	
Input detects and reports numeric input that is negative	**3%**	
Input detects and reports numeric input that is greater than maximum input value	**2%**	
Reports in the following **order**:		
1. Even or odd.	**5%**	
2. Triangular number.	**5%**	
3. Prime or composite.	**10%**	
4. Square number.	**10%**	
5. Power of two.	**10%**	
6. Is a factorial.	**10%**	
7. Is a Fibonacci number.	**10%**	
8. Perfect, abundant, or deficient number.	**10%**	
9. The even parity bit	**5%**	
10. The number of decimal digits	**5%**	
11. Palindromic digits	**3%**	
12. The representation in binary digits	**3%**	
13. The representation in decimal digits with thousands separators.	**4%**	
Non-functional requirements		
Visual Studio project doesn't generate a program named `'numbers.exe'`	**-10%**	
Compiles on both MSVC `/std:c17` and `cc -std=c17` (Cygwin)	**-5%**	
Penalties from *C & C++ Grading Guide* ***v2.2.0***	**various**	
Late submission • One to five days late • More than five days late	**-10%/day** **-100%**	
Total	**100%**	**100%**

Submission Requirements

1. Submit **entire Visual Studio project directory** to Fanshawe Online
   a. Delete ***all*** debug and release directories.[i]
   b. Submit in a .ZIP, .7z archive file.

[i] Alternatively, you can 'clean' your project for submission by downloading 'vsclean' a Visual Studio Solution Cleaner from https://www.gats.ca/software/vsclean/ .