Introduction

For this assignment you will be writing the C# code to compute some standard math computations, the square root, the period of a division and the $e^x$ power function. You are not allowed to use any of the built in Math.<whatever> methods.

Assignment

1. Write and demonstrate a square root method: `public static double Sqrt(double x)`

   The ancient Babylonians used a divide and average method for computing the square root of a positive number. This is their technique:

   a: Make an estimate of the square root, $r$. Any positive estimate will work.
   b: Compute the quotient, $x/r$
   c: Average the quotient and $r$, this is the new estimate of the square root
   d: Continue this process until some precision criteria is met.

   Your program should continue to repeat this procedure until two successive estimates are within 0.0000001 of each other.

2. Write and demonstrate a period method: `public static string Period(double x)`

   Consider the following example:

   \[
   \frac{1}{7} = 0.142857142857142857...
   \]

   The period for this result is: 142857

   The following technique can be used to determine the period in the division of $1/n$, where $n$ is not divisible by 2 or 5.

   a: The number of digits in the period is equal to the number of zeros in the smallest power of 10 that has a remainder of 1, when divided by $n$. For example, $1/37$:
      1. $10 \% 37 = 10$
      2. $100 \% 37 = 26$
      3. $1000 \% 37 = 1$
   b: Therefore, the number of digits in the period for $1/37$ is 3, given that there are 3 zeros in the number 1000.

3. Write and demonstrate an $e^x$ method: `public static double Exp(double x)`

   $e^x$ can be estimated by the following series...
\[ e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots + \frac{x^n}{n!} \]

Your program should continue to repeat this series until two successive estimates are within 0.0000001 of each other.

The screen shot below illustrates the general form of the output of your program. Your program should compute the same numbers as shown below and, at least, 3 additional examples for each method.

NOTES:

- Due: Friday, January 26th
- Include the heading required by your section at the top of your program
- Follow the style guidelines
- When complete submit your entire Visual Studio solution directory (minus the /bin and /obj directories)
- Submit through Eagle