Homework 5

Note: 這次 Lab 是作 loop 的練習, 請<u>不要使用</u> pow 函數, 請<u>不要使用陣列</u>.
(This homework designed for the loop practice. Please do not use array or pow function)

1. Write a program to approximate the value of e using the formula:

$$e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \cdots$$

(a). Stop when the added term is less than 10^{-6}.

(b). Stop when the difference between the two successive terms is less than 0.001.

2. Write a program to approximate the value of sin(x) using the formula:

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \ldots + \frac{(-1)^{n+1} x^{2n-1}}{(2n-1)!}$$

(x 值由 keyboard key in).

The program stop when $\dfrac{(-1)^{n+1} x^{2n-1}}{(2n-1)!} < 10^{-8}$

3. Write a program that prompts the user to input a positive integer and then outputs the individual digits of the number.
(**while loop only**)

4. Write a program to convert binary numbers to decimal.

(First you can decompose a binary number into separate digits.)

5. (加分題，可以不寫) This is an extra point question, you may not write.

In cryptarithmetic puzzles, mathematical equations are written using letters.

Each letter can be a digit from 0 to 9, but no two letters can be the same.

Here is a sample problem:

SEND + MORE = MONEY   (9567+ 1085 = =10652)

A solution to the puzzle is
S = 9, R = 8, O = 0, M = 1, Y = 2, E = 5, N = 6, D = 7

Question:

Write a program that finds solutions to the cryptarithmetic puzzle of:

TOO + TOO + TOO + TOO = GOOD

The simplest technique is to use a nested loop for each unique letter (in this case T, O, G, D). The loops would systematically assign the digits from 0-9 to each letter.

For example,
it might first try T = 0, O = 0, G = 0, D = 0, then
  T = 0, O = 0, G =0, D = 1, then
  T = 0, O = 0, G = 0, D = 2, etc. up to
  T = 9, O = 9, G = 9, D = 9.

In the loop body test that each variable is unique and that the equation
is satisfied.

Output the values for the letters that satisfy the equation.