Homework 9 (Deadline 15:00, May 27, submit your files to TronClass)

Please submit the source code only. The file name should include your student ID number. For example, if your ID number is 406290123, then the file names for problems 1 and 2 should be **406290123_hw9_1.txt** and **406290123_hw9_2.txt**, respectively.

1. Write a function to determine if the input integer n is a prime number and if it is an additive prime number

   Additive prime number: The sum of all digits is a prime number.

   For example, n=133, 1+3+3=7 is a prime number, so n is an additive prime number.

   void function(int n, int& x, int&y)

   if n is a prime number, x=1, otherwise x=0.

   if n is an additive prime number, y=1, otherwise y=0.

2. Consider the integral,

   $\int_{-5}^{1} e^{-x} (\sin 5x)\ dx.$

   Use the Simpson's rule to find the approximate values of this integral with different numbers of intervals, using the values of m in the range of [50, 1000] in steps of 50. Give the results in the following format. Note that the number of intervals is $2\mathrm{m}$.

m	integral
50	xxxxx
100	xxxxx
….	
1000	xxxxx

You are required to create two functions. One is used to give the function value of the integrand, $e^{-x}(\sin 5x)$. The other one is used to implement the Simpson's rule, including the result as one of the parameters.

`void simpson(int m, double a, double b, double &s)`

`s` gives the approximate value of the integral.

Extra point problem: Find the exact value of the integral and determine the minimum value of m such that the error is less than 10^{-6}.

3. Generalized Fibonacci series F(a,b,n)

$$F(a,b,n) = F(a,b,n-1)\ a + F(a,b,n-2)\ b,$$
$$F(a,b,0) = a \text{ and } F(a,b,1) = b,$$

Write a function `fibonacciInt(a,b,n)` that use type `int` to calculate the *n*th Generalized Fibonacci number.

Input

Three integers, a, b, n in one line. All must be positive.

Output

One integer $\mathrm{F(a,b,n)}$.