

Laboratory 2

There are TWO problems to this lab assignment.

Problem 1

The Fibonacci Sequence is a series of integers. The first two numbers in the sequence are both 1; after that, each number is the sum of the preceding two numbers.

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, ...

For example, $1+1=2$, $1+2=3$, $2+3=5$, $3+5=8$, etc.

The n th Fibonacci number is the n th number in this sequence, so for example $\text{fibonacci}(1)=1$, $\text{fibonacci}(2)=1$, $\text{fibonacci}(3)=2$, $\text{fibonacci}(4)=3$, etc. Do *not* use zero-based counting; $\text{fibonacci}(4)$ is 3, *not* 5.

Your assignment is to write an assembler code (Fibonacci.s) that asks the user for the n^{th} term in the Fibonacci sequence. Your program should then calculate the n^{th} Fibonacci number and print it out.

For example, your program should produce the following outputs:

Enter Fibonacci term: 6

The 6th Fibonacci number is 8

Problem 2

The Euclidean algorithm is a way to find the *greatest common divisor* of two positive integers, a and b . First let me show the computations for $a=210$ and $b=45$.

- Divide 210 by 45, and get the result 4 with remainder 30, so $210=4\cdot 45+30$.
- Divide 45 by 30, and get the result 1 with remainder 15, so $45=1\cdot 30+15$.
- Divide 30 by 15, and get the result 2 with remainder 0, so $30=2\cdot 15+0$.
- The greatest common divisor of 210 and 45 is 15.

Formal description of the Euclidean algorithm

- **Input** Two positive integers, a and b .
- **Output** The greatest common divisor, g , of a and b .
- **Internal computation**
 1. If $a < b$, exchange a and b .
 2. Divide a by b and get the remainder, r . If $r=0$, report b as the GCD of a and b .
 3. Replace a by b and replace b by r . Return to the previous step.

Your assignment is to write an assembler code (gcd.s) that asks the user two positive numbers and calculates their greatest common denominator.

For example, your program should produce the following outputs:

Enter first positive integer: 6

Enter second positive integer: 8

The GCD is 2