

1. (3 Marks)

The Fibonacci sequence is **0, 1, 2, 3, 5, 8, 13, 21, ...** Write a Ruby program to display the sequence up to the 10<sup>th</sup> term. The recursive algorithm of the sequence is:

```
START subroutine fib()  
receive positive integer fib(n)  
if n = 0 or n = 1 then return n  
else return fib(n-1) + fib(n-1)  
END subroutine fib()
```

Include the algorithm in a method. The expected output is shown below.

**Fibonacci sequence: 0 1 1 2 3 5 8 13 21 34**

2. (4 Marks)

Using a Ruby class named **ComplexMath**, write a program that will add and multiply two complex numbers. Your program should also compute the magnitude of a complex number. A sample output is shown below.

**Addition: 4 + j6  
Multiplication: -5 + j10  
Magnitude: 3.605551275463989**

3. (2 Marks)

Write a Ruby program to iterate an array starting from the last element. A sample output is shown below.

**Original array:  
[10, 20, 30, 40, 50, 60, 70]  
Reverse array:  
-> 70 -> 60 -> 50 -> 40 -> 30 -> 20 -> 10**

4. (3 Marks)

Consider the string shown below.

**"Arduino Uno uses ATmega328 8-bit controller that has 32 16-bit registers"**

Write a program that will extract from the string all the numbers (use method **scan(/regex/)**) and store them in an array. The program then computes and displays the total sum of the numbers. The expected output is shown below.

**["328", "8", "32", "16"]  
Sum = 384**

5. (3 Marks)

Implement the Fibonacci sequence iteratively using a **lambda**. The output is the same as in Q1.