Programming Assignment 1 :

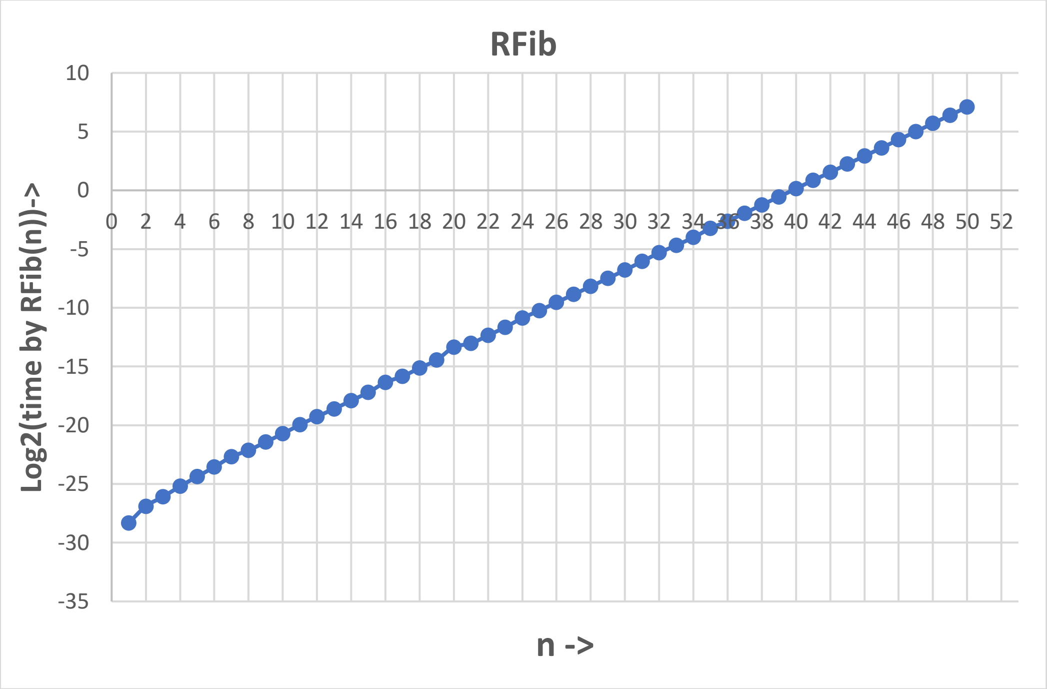
Does the efficiency of algorithms really matter?

Question-1:

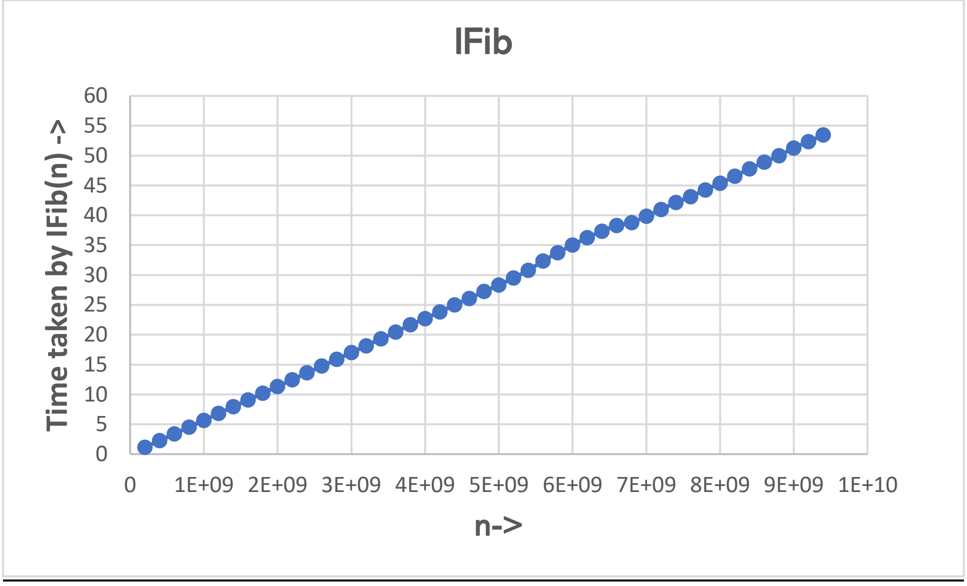
Time/Function	0.001s	0.1s	1s	5s	60s	600s
RFib	26	34	39	43	48	53
IFib	10^5	1.74*10^7	1.76*10^8	8.81*10^8	1.0582*10^10	1.0582*10^11
CleverFib	>10^18	>10^18	>10^18	>10^18	>10^18	>10^18

Question-2:

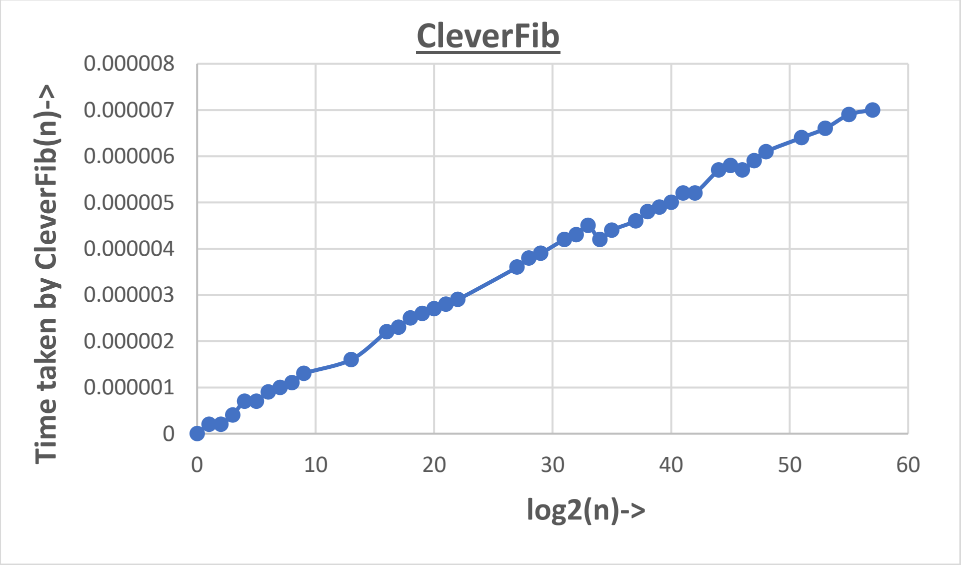
(i)



(ii)



(iii)



(a)

RFib- Rfib calls itself twice in it.So, total number of recursive calls grows exponentially. Hence time grows exponentially.

IFib- no. of iterations in IFib(n) are n-1 and there are three instructions in each iteration. So, graph of time vs n is linear

CleverFib- the recursive function has some constant number of instructions, and it is called log2(n-1) times. So time vs log2(n) is linear.

(b)

Slope in graph of RFib- 0.707

Slope in graph of IFib- 0.568*10^-8

Slope in graph of CleverFib- 1.22*10^-7

Slope of these graphs are directly related to the total number of instructions executed. And also depends on what functions we have used for time and input variables on y-axis and x-axis respectively.

(c)

(i)

Time difference between multiplication and addition will not affect the total running time much as it is just a constant value not having a very big magnitude which is just multiplied with total number of instructions executed to get total time, so it’s the total number of instructions (including recursive calls) that will affect the total runtime. And this number grows exponentially for RFib and logarithmically for CleverFib.

(ii)

No,as speed is inversely proportional to total time taken. That don’t have much effect of this time difference of multiplication and addition.

Question-3:

Yes

Yes