ESO207A

Programming Assignment 1

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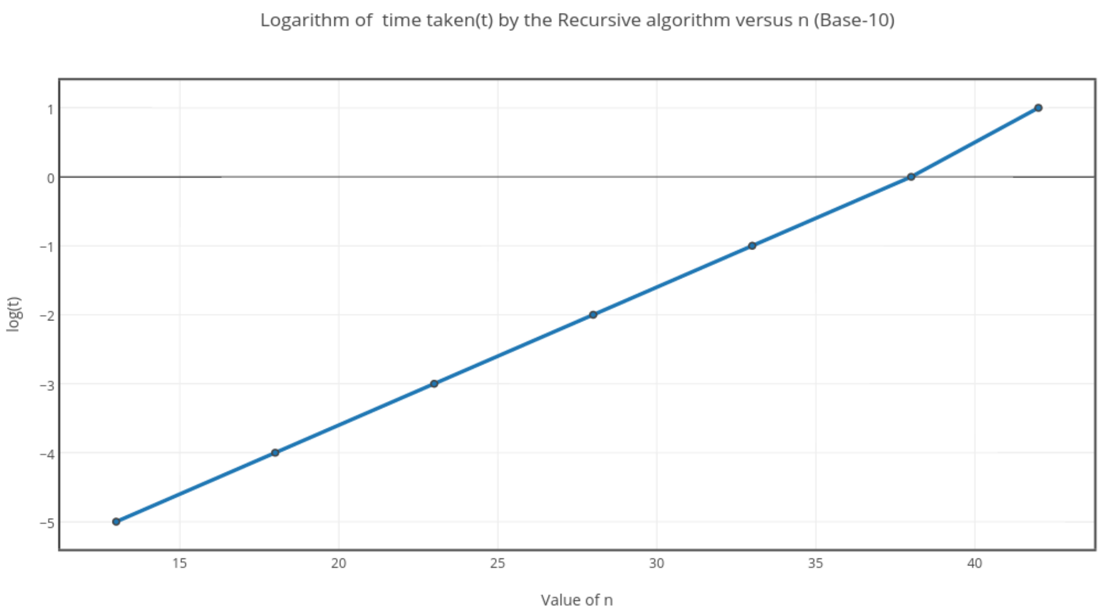
Part-1

For **a=2 , b=3 , c=5 , m = 100** we get these values for n corresponding to t .

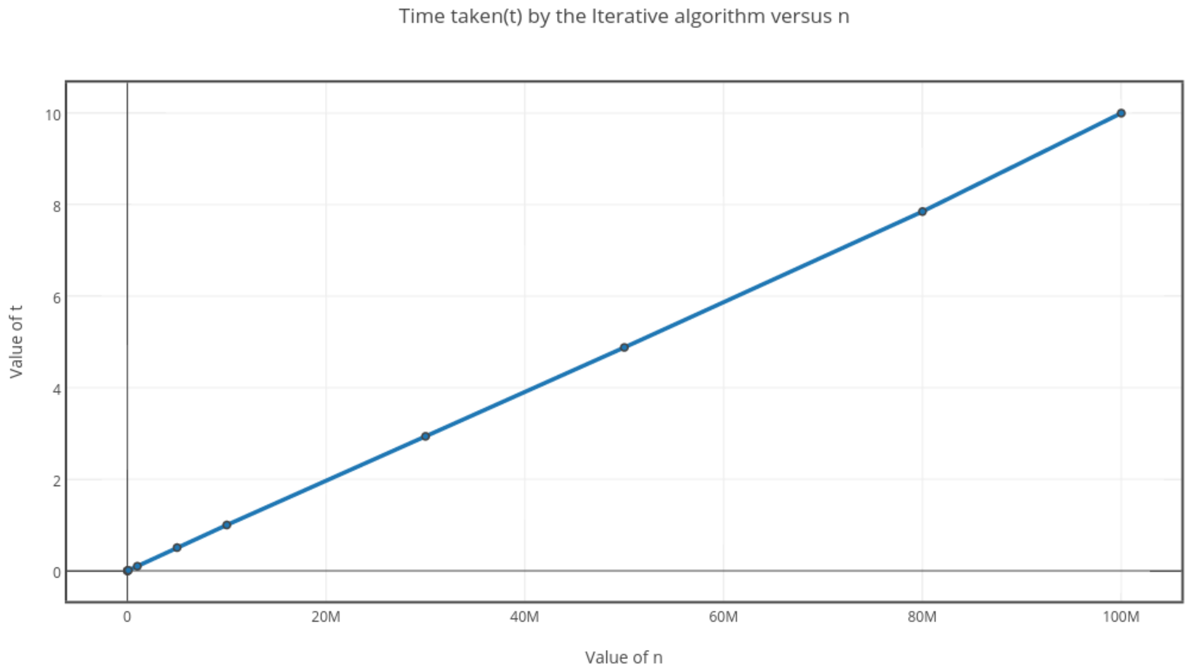
Time taken to compute G(n) mod m (in seconds)	**10^{-5}**	**10^{-4}**	**10^{-3}**	**10^{-2}**	**10^{-1}**	**1**	**10**
Max value of n for recursive algorithm	13	18	23	28	33	38	42
Max value of n for iterative algorithm	92	745	9100	97000 (~10^5)	999001 (~10^6)	10000000 (~10^7)	100000000 (~10^8)
Max value of n for matrix method	10	2500000 (~10^6)	>10^{18}	>10^{18}	>10^{18}	>10^{18}	>10^{18}

Part-2

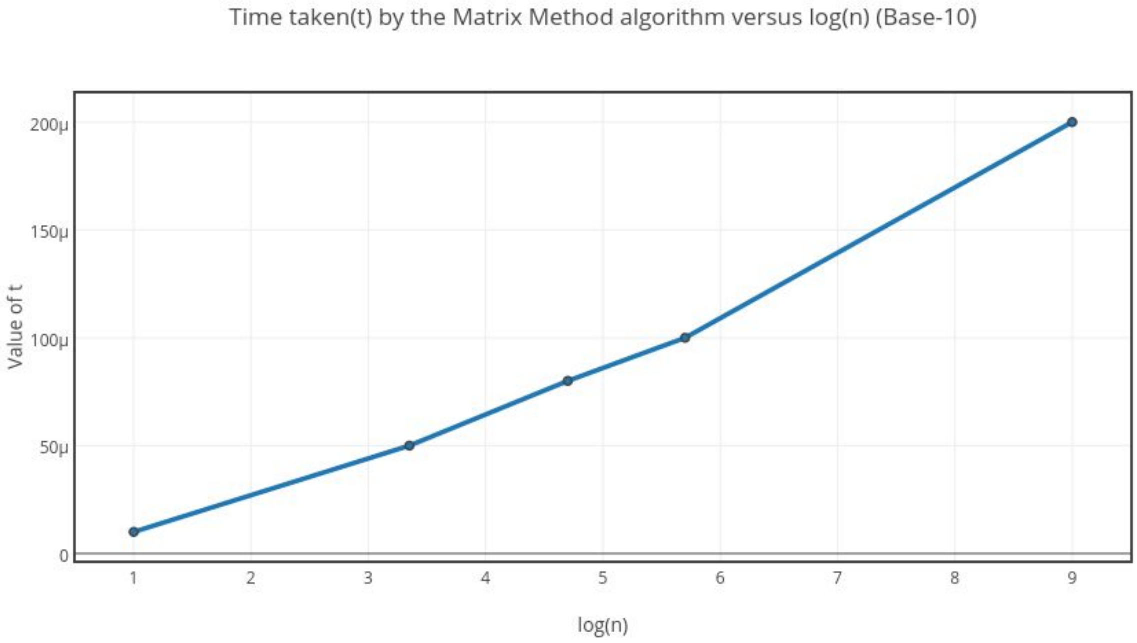
Plot of the logarithm of the time taken by the recursive algorithm versus n



Plot the time taken by the iterative algorithm versus n



Plot the time taken by the matrix method algorithm versus the logarithm of n



Part-3

Since for the **Recursive** algorithm time complexity is **O(2^n)** hence

$$T = k*2^n$$

$$\log(T) = \log(k) + n*\log(2)$$

Hence log(t) vs n is a linear equation of type **y = mx+c** .

So graph of **log(t) vs n** is a **straight line**

Time complexity for **Iterative** algorithm is **O(n)** hence

$$T = k*n$$

Hence t vs n is a linear equation of type **y = mx+c** .

So graph of **t vs n** is a **straight line**

Time complexity for **Matrix method** algorithm is **O(logn)**

$$T = k*\log n$$

Hence t vs log(n) is a linear equation of type **y = mx+c** .

So graph of **t vs log(n)** is a **straight line**

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