Mohamed AbdelHalem_1180182

Assignment_1

Problem 1.1 Fibonacci Number:

The way I solved this problem:

On understanding Pisano Period where getting moduls of a given number with Fibonacci numbers we will find a pattern that starts with 01 each time

So, we find that length of the period and get it’s moduls with the N and the output is then the new N for the Fibonacci number to be used with the moduls m.

So, I needed a way to get the Pisano Period and the way I got it is simply by

*

Getting moduls of m with normal Fibonacci and on getting 0 and 1 give me the length of the period which will be I+1 and then I call the implemented normal Fibonacci function above and give it the new N

*

```
Let PisanoPeriod,Previous,Current=0,0,1
For I on m*m
Previous,Current=Current,(Previous+Current)%M
Then if previous and current =0, 1
PisanoPeriod=I+1
New N=Old N% PisaontPeriod
Then give the new N and the M to Fibonacci function
```

Big O:O (new N) +O(M^2) which is equivalent to O(M^2)

Sources used in this problem:

Fibonacci Mystery - Numberphile

Problem 1.2 Maximum Advertisement Revenue:

On this problem on order to get maximum revenue you have to get maximum dot product between inputs given

So I first sorted the 2 arrays using bubble sort and looped on their length and did calculate sum of their multiplications after sorting them which gave me the maximum revenue.

Bubble sort algorithm explanation:

We use 2 for loops first one on the length –1 as on last iteration it's already sorted and 2nd one on n-1-I we do subtract I because each time last element becomes the largest then inside the 2nd loop we check if current element is bigger than next one if so then swap them and repeat the process with each 2 elements

```
Sort(arr):
    For I in range (n-1)
    For j in range(n-1-I)
    if(arr[j]>arr[j+1]):
    swap them
Sort(a)
Sort(b)
Summation=0
Loop on a or b
Multiply each element of a and b a[I]*b[I]
And add to summation
```

Return summation

Big O: O(N^2) +O(N) which is equivalent to O(N^2)

Note: Big O calculations are approximated and on the worst-case scenario.

Sources used in this problem:

https://www.youtube.com/watch?v=nmhjrI-aW5o