

CS3201

Algorithm Design

Term Project Report

Problem: 1079

Maximum

Submitted to

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1. INTRODUCTION

1.1) Problem Detail

Problem number: 1079

Problem name: Maximum

Difficulty: 112

Problem Author: Emil Kelevedzhiev

Problem Source: Winter Mathematical Festival Varna '2001 Informatics

Tournament

Problem Conditions: Time Limit - 2.0 second, Memory Limit -64MB

1.2) Problem Description

Consider the sequence of numbers a_i , i = 0, 1, 2, ..., which satisfies the following requirements:

- \bullet $a_0 = 0$
- $a_1 = 1$
- \bullet $a_{2i} = a_i$
- $a_{2i+1} = a_i + a_{i+1}$

For every i = 1,2,3,...

Write a program which for a given value of n finds the largest number among the numbers $a_0, a_1, ..., a_n$.

1.3) Input and Output

Input: You are given several test cases (not more than 10). Each test case is a line containing an integer $n(1 \le n \le 99999)$. The last line of input contains 0.

Output: For every n in the input write the corresponding maximum value found.

Sample

Input	Output
5 10 0	3 4

2) CODE OVERVIEW

2.1) Coding

```
n = int(input())
lists = []
while n != 0:
       lists.append(n)
        n = int(input())
highest = max(lists) + 1
a=[0 for x in range(highest)]
a[0] = 0
a[1] = 1
for x in range(2,highest):
       if x % 2 == 0:
                a[x] = a[x//2]
        else:
                a[x] = a[x//2] + a[x//2 +1]
for x in lists:
        print (max(a[:x+1]))
```

2.2)Code Explanation

Line 1: Firstly, we declared a variable "n" which is set to accept an input and convert it to integer.

Line 2: Next, we declared a list called "lists".

Line 4 - 6: The condition of "While" loop is that if the input "n" is 0, it will stop adding numbers to the list "lists".

Line 8: A variable "highest" is declared to accept the maximum value of the list "lists" and then add 1 (Eg: maximum value = 10, highest = 10 + 1)

```
a=[0 for x in range(highest)]
a[0] = 0
a[1] = 1
for x in range(2,highest):
    if x % 2 == 0:
        a[x] = a[x//2]
    else:
        a[x] = a[x//2] + a[x//2 +1]

for x in lists:
    print (max(a[:x+1]))
```

Line 10: We create a list 'a' of 0 length equivalent to the highest.

Line 11: As mentioned in the question we assigned a[0] = 0

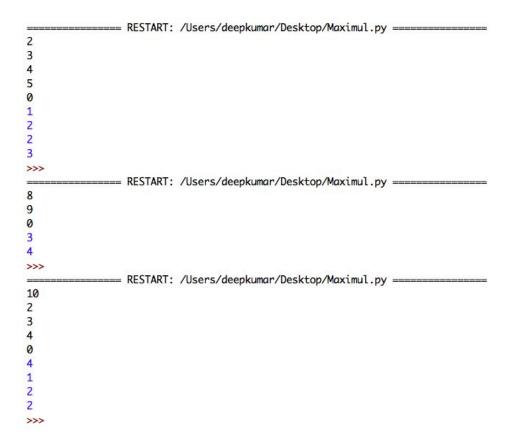
Line 12: We assigned a[1] = 1.

Line 13: We looped from the 2nd index to (Highest - 1) index.

Line 14 -18: Inside the loop the conditions were if x % 2 is equivalent then we assign a[x] as the value of a[x//2]. The other condition was if the above condition was not satisfied then a[x] will be assigned as a[x//2] + a[x//2 + 1].

Line 20 - 21: We loop through the lists and find the maximum numbers we have in the list 'a' and print the maximum.

2.3)Output



3) SUBMISSION RESULT

3.1) Timus Status

Solutions judgement results

	Duto	Aution	, robiciii	Lunguage	oudgement result	1001#	time	used
7876269	20:52:17 8 May 2018	<u>Deep</u>	1079. Maximum	Python 3.6	Accepted		0.202	2 080 KB
ID	Date	Author	Problem	Language	Judgement result	Test#	Execution time	Memory used

3.2) Submission Detail

LANGUAGE:- Python 3.6

Execution Time :- 0.202 & 0.187

Memory Used: - 2.080 KB