



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 , $i = 0, 1, 2, \dots$, which satisfies the following requirements:

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

For every $i = 1, 2, 3, \dots$

Write a program which for a given value of n finds the largest number among the numbers a_0, a_1, \dots, 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 ($1 \leq n \leq 99999$). The last line of input contains 0.

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

Sample

Input	Output
5	3
10	4
0	

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

```

===== RESTART: /Users/deepkumar/Desktop/Maximul.py =====
2
3
4
5
0
1
2
2
3
>>>
===== RESTART: /Users/deepkumar/Desktop/Maximul.py =====
8
9
0
3
4
>>>
===== RESTART: /Users/deepkumar/Desktop/Maximul.py =====
10
2
3
4
0
4
1
2
2
>>>

```

3) SUBMISSION RESULT

3.1) Timus Status

Solutions judgement results

ID	Date	Author	Problem	Language	Judgement result	Test #	Execution time	Memory used
7876269	20:52:17 8 May 2018	Deep	1079. Maximum	Python 3.6	Accepted		0.202	2 080 KB

ID	Date	Author	Problem	Language	Judgement result	Test #	Execution time	Memory used
7876409	22:58:02 8 May 2018	Sai	1079. Maximum	Python 3.6	Accepted		0.187	2 080 KB

3.2) Submission Detail

LANGUAGE :- Python 3.6

Execution Time :- 0.202 & 0.187

Memory Used :- 2.080 KB