

**Performance Test - 1**  
**CSE-200**

Time: 1 hour 30 minutes, Full Marks: 40

**Student ID:**

**Problem - 1:**

Description:	<p>Let us consider the following series,</p> $F_0 = 0$ $F_1 = 2$ $F_2 = 1$ $F_n = F_{n-1} + F_{n-3}$ <p>Some few starting values of the series are: 0, 2, 1, 1, 3, 4, 5, 8, 12, ...</p> <p>Now, you will be given an integer value, <math>X</math> and you need to output "YES" if <math>X</math> is a member of the series, "NO" otherwise.</p>
Constraints:	$1 \leq X \leq 10^{18}$
Limit:	Time: 1s Memory: 64 MB
Sample In 1:	8
Sample Out 1:	YES
Sample In 2:	9
Sample Out 2:	NO

**Problem - 2:**

Description:	<p>You are given a binary string (consisting of characters '0' and '1'), <math>S</math> of length <math>n</math>. You can color each position of the string with red, green, or blue paint only if the character in that position is '1'. You need to say in how many ways you can color that string. It is guaranteed that the string will contain at least one character with a value equal to '1'.</p> <p>Since the number of ways can be very large, you need to output the result modulo <math>10^9 + 7</math>.</p>
Constraints:	$1 \leq n \leq 10^5$ $S_i \in \{0, 1\}$
Limit:	Time: 1s Memory: 64 MB
Sample In 1:	3 101
Sample Out 1:	9
Sample In 2:	5 00100
Sample Out 2:	3

**Problem - 3:**

Description:	<p>You are given a two dimensional matrix <math>A_{N \times N}</math>, in sorted order. That means, each row is sorted in non-decreasing order and the values in the <math>i</math>'th row are less than or equal to the values in the <math>(i+1)</math>'th row.</p> <p>Now, you will be given an integer value <math>X</math> and you have to output "YES" if the matrix contains the value <math>X</math>, "NO" otherwise.</p> <p><b>Note: You need to solve this task using binary search.</b></p>
Constraints:	$1 \leq N \leq 10^3$ $1 \leq A_{i,j} \leq 10^9$ $1 \leq X \leq 10^9$
Limit:	Time: 1s Memory: 256 MB
Sample In 1:	3 1 2 5 6 6 7 7 8 9  5
Sample Out 1:	YES
Sample In 2:	3 1 2 5 6 6 7 7 8 9  4
Sample Out 2:	NO

**Problem - 4:**

Description:	<p>All integer numbers are divisible by primes. If a number is divisible by more than one prime number, then it obviously has a largest prime divisor. The numbers which do not fall in this category do not have a largest prime divisor. Given <b>M</b> integer numbers (<b>N</b>) your job is to write a program that finds its largest prime divisor for N.</p> <p>If the input number is not divisible by more than one prime number then print '-1'.</p>
Constraints:	$1 \leq N \leq 10^{12}$ $1 \leq M \leq 500$
Limit:	Time: 1s Memory: 64 MB
Sample Input	4 2 6 4 100
Sample Out 1:	-1 3 -1 5