Question 1

A binary number is a combination of 1s and 0s. Its n^{th} least significant digit is the n^{th} digit starting from the right starting with 1. Given a decimal number, convert it to binary and determine the value of the the 4^{th} least significant digit.

Example

number = 23

· Convert the decimal number 23 to binary number: $23_{10} = 2^4 + 2^2 + 2^1 + 2^0 = (10111)_2$.

· The value of the 4^{th} index from the right in the binary representation is 0.

Function Description

Complete the function fourthBit in the editor below.

fourthBit has the following parameter(s):

int number: a decimal integer

Returns:

int: an integer 0 or 1 matching the 4th least significant digit in the binary representation of number.

Constraints

$0 \leq number < 2^{31}$

Input Format for Custom Testing

Input from stdin will be processed as follows and passed to the function.

The only line contains an integer, number.

Sample Case 0

Sample Input 0

STDIN Function

----- --------

32 → number = 32

Sample Output 0

0

Explanation 0

· Convert the decimal number 32 to binary number: $32_{10} = (100000)_2$.

· The value of the 4th index from the right in the binary representation is 0.

Sample Case 1

Sample Input 1

STDIN Function

----- --------

77 → number = 77

Sample Output 1

1

Explanation 1

· Convert the decimal number 77 to binary number: $77_{10} = (1001101)_2$.

· The value of the 4th index from the right in the binary representation is 1.

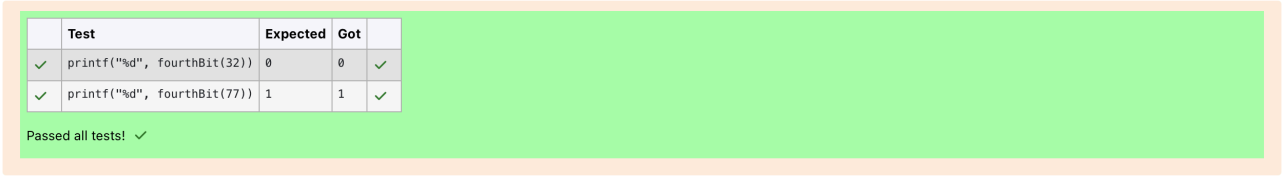
Program:

```
/*
*
* Complete the 'fourthBit' function below.
* The function is expected to return an INTEGER.
*  The function accepts INTEGER number as parameter.
*/

int fourthBit(int number)
{
        int binary[32];
        int i=0;
        while(number>0)
        {
                binary[i]=number%2;
```

```
            number/=2;
            i++;
        }
        if(i>=4)
        {
            return binary[3];
        }
        else
        return 0;
}
```

Output:



	Test	Expected	Got	
✓	printf("%d", fourthBit(32))	0	0	✓
✓	printf("%d", fourthBit(77))	1	1	✓

Passed all tests! ✓

Question 2

Question text
Determine the factors of a number (i.e., all positive integer values that evenly divide into a number) and then return the p_{th} element of the list, sorted ascending. If there is no p_{th} element, return 0.

Example
n = 20
p = 3

The factors of 20 in ascending order are {1, 2, 4, 5, 10, 20}. Using 1-based indexing, if p = 3, then 4 is returned. If p > 6, 0 would be returned.

Function Description
Complete the function pthFactor in the editor below.
pthFactor has the following parameter(s):
int n: the integer whose factors are to be found
int p: the index of the factor to be returned

Returns:
int: the long integer value of the p_{th} integer factor of n or, if there is no factor at that index, then 0 is returned

Constraints
$1 \le n \le 10^{15}$
$1 \le p \le 10^{9}$

Input Format for Custom Testing
Input from stdin will be processed as follows and passed to the function.
The first line contains an integer n, the number to factor.
The second line contains an integer p, the 1-based index of the factor to return.

Sample Case 0
Sample Input 0

STDIN		Function
10	→	n = 10
3	→	p = 3

Sample Output 0
5

Explanation 0
Factoring n = 10 results in {1, 2, 5, 10}. Return the p = 3rd factor, 5, as the answer.

Sample Case 1
Sample Input 1

STDIN		Function
10	→	n = 10
5	→	p = 5

Sample Output 1
0
Explanation 1
Factoring n = 10 results in {1, 2, 5, 10}. There are only 4 factors and p = 5, therefore 0 is returned as the answer.

Sample Case 2
Sample Input 2

STDIN		Function
1	→	n = 1
1	→	p = 1

Sample Output 2
1

Explanation 2
Factoring n = 1 results in {1}. The p = 1st factor of 1 is returned as the answer.

Program:

```
/*
* Complete the 'pthFactor' function below.
* The function is expected to return a LONG
* The function accepts following parameters:
* 1. LONG INTEGER n
* 2. LONG INTEGER p
*/

long pthFactor(long n, long p)
{
	int count=0;
	for(long i=1;i<=n;++i)
	{
		if(n%i==0)
		{
			count++;
			if(count==p)
			{
				return i;
			}
		}
	}
	return 0;
}
```

Output:

	Test	Expected	Got	
✓	printf("%ld", pthFactor(10, 3))	5	5	✓
✓	printf("%ld", pthFactor(10, 5))	0	0	✓
✓	printf("%ld", pthFactor(1, 1))	1	1	✓

Passed all tests! ✓