ACSL

2005 - 2006 **American Computer Science League** **All-Star #5**

Cyclic Redundancy Checks

PROBLEM: In a simple application of error checking in message transmission, a sender transmits a message, a key and a checksum. The receiver of the message divides the message by the key and determines if the remainder matches the checksum sent. If all the message parts are converted to binary, then the division in modulo 2 is equivalent to the long division algorithm except rather than subtracting the bits, they are XORed. The following example demonstrates the algorithm:

000010011000 ÷ 0101

```
000010011000
   101
    111
    101
     100
     101
      100
      101
       01
```

Note that the quotient is not important and not kept. The remainder is always expressed using the number of significant bits in the key minus 1. Sample Input #1 gives the data for the example above.

INPUT: There will be 10 lines of input. Each line will contain 2 values: the message and the key. The 2 values will be given in hexadecimal.

OUTPUT: For each input line, using the algorithm above, print the remainder when the message is divided by the key.

SAMPLE INPUT	**SAMPLE OUTPUT**
1. 098, 5	1. 01 (the 0 is required).
2. F, 3	2. 0
3. AC, 5	3. 11
4. 71C, A	4. 000
5. 8E6B, 6	5. 01