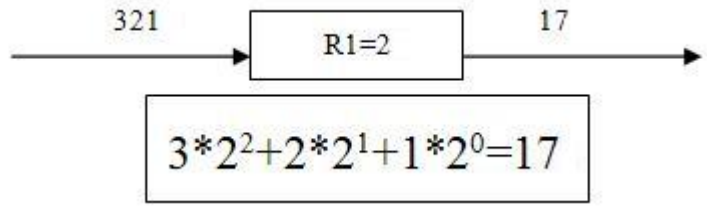
#25 - Converter

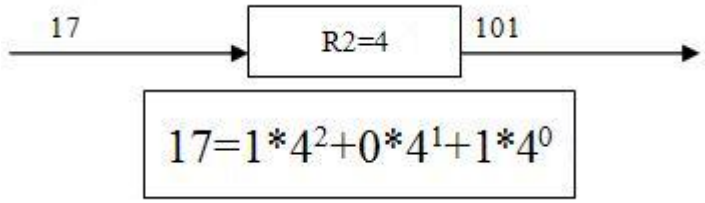
Created by : PCLP

ITS Lab produced a batch of number system converter recently. There are two kind of converter R1 and R2.

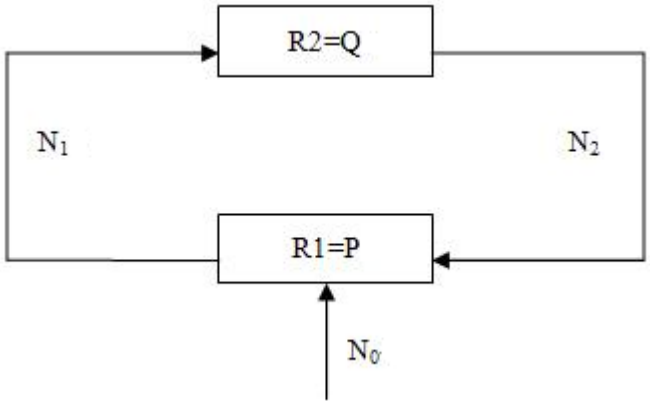
Given a parameter of P, converter R1's function is to transform the incoming P based integer into decimal number system. To simplify the design, R1 will not check that if the input is legal in P number system.



R2 is similar to R1, while acting an inverse function: convert a decimal number to Q (specified by R2) number system.



Mr. R, a researcher of ITS Lab, made a circuit uses R1 and R2:



(The circuit works at an order R1, R2, R1, R2 ...)

And he found an interesting phenomenon: if P < Q then for any input sequence N0, after plenty of convention N1 will finally equal to N2. For example, P=2, Q=4, N0=321, finally, N1=N2=3.

Mr. R is excited for his discover, and wants to know what N1 and N2 will finally be in this circuit when P, Q and N0 is given.

Input

The input contains several test cases. The first line is the number of test cases.

The first line of each test case specifies two number P and Q (1 < P < Q < 37), follow by N0 (the length of N0 is not larger than 5,000,000). Note that a digit larger than 9 is given in small letters, e.g. 'a'=10, 'b'=11 ... and so on.

Output

For each test case, output a line standing for the final sequence in the circuit.

Sample Input

```
2
2 4
321
19 25
3888175
```

Sample Output

```
3
m
```

Problem Requirement

Runtime Limit : 1 seconds
Memory Limit : 16000 bytes