

## 6153 LCM Pair Sum

One of your friends desperately needs your help. He is working with a secret agency and doing some encoding stuffs. As the mission is confidential he does not tell you much about that, he just want you to help him with a special property of a number. This property can be expressed as a function  $f(n)$  for a positive integer  $n$ . It is defined as:

$$f(n) = \sum_{\substack{1 \leq p \leq q \leq n \\ \text{lcm}(p, q) = n}} (p + q)$$

In other words, he needs the sum of all possible pairs whose least common multiple is  $n$ . (The least common multiple (LCM) of two numbers  $p$  and  $q$  is the lowest positive integer which can be perfectly divided by both  $p$  and  $q$ ). For example, there are 5 different pairs having their LCM equal to 6 as (1, 6), (2, 6), (2, 3), (3, 6), (6, 6). So  $f(6)$  is calculated as  $f(6) = (1 + 6) + (2 + 6) + (2 + 3) + (3 + 6) + (6 + 6) = 7 + 8 + 5 + 9 + 12 = 41$ .

Your friend knows you are good at solving this kind of problems, so he asked you to lend a hand. He also does not want to disturb you much, so to assist you he has factorized the number. He thinks it may help you.

### Input

The first line of input will contain the number of test cases  $T$  ( $T \leq 500$ ). After that there will be  $T$  test cases. Each of the test cases will start with a positive number  $C$  ( $C \leq 15$ ) denoting the number of prime factors of  $n$ . Then there will be  $C$  lines each containing two numbers  $P_i$  and  $a_i$  denoting the prime factor and its power ( $P_i$  is a prime between 2 and 1000) and ( $1 \leq a_i \leq 50$ ). All the primes for an input case will be distinct.

### Output

For each of the test cases produce one line of output denoting the case number and  $f(n)$  modulo 1000000007. See the output for sample input for exact formatting.

### Sample Input

```
3
2
2 1
3 1
2
2 2
3 1
1
5 1
```

**Sample Output**

Case 1: 41

Case 2: 117

Case 3: 16