DreamGrid has n integers $a_1, a_2, \ldots, a_n$. DreamGrid also has m queries, and each time he would like to know the value of

$$\sum_{1 \le i \le n} \left\lfloor \frac{a_i}{\lceil \log_p a_i \rceil} \right\rfloor$$

Input

There are multiple test cases. The first line of input is an integer T indicating the number of test cases. For each test case:

The first line contains two integers n and m ($1 \le n, m \le 5 \times 10^5$) -- the number of integers and the number of queries.

The second line contains n integers $a_1, a_2, \ldots, a_n$ ($2 \le a_i \le 10^9$).

The third line contains m integers $p_1, p_2, \ldots, p_m$ ($2 \le p_i \le 10^9$).

It is guaranteed that neither the sum of all n nor the sum of all m exceeds 2×10^6.

Output

For each test case, output an integer $(\sum_{i=1}^{m} i \cdot z_i) \bmod 10^9$, where z_i is the answer for the i-th query.

Sample Input

```
2
3 2
100 1000 10000
100 10
4 5
2323 223 12312 3
1232 324 2 3 5
```

Sample Output

```
11366
45619
```

```
2018 if winter comes can spring be far behind
15 zhejiang provincial collegiate programming contest
3 bbbbb bcd
3 a aa
```