

## Problem J. Series Sum

Input file: *standard input*  
Output file: *standard output*  
Time limit: 2 seconds  
Memory limit: 512 mebibytes

Given are two integers  $k$  and  $p$ . Calculate

$$\sum_{n=k}^{\infty} \frac{\binom{n}{k}^p}{2^n},$$

where  $\binom{n}{k}$  denotes a binomial coefficient that equals to  $\frac{n!}{k! \cdot (n-k)!}$ .

It is guaranteed that the result can be represented in the form of  $\frac{r}{q}$  where  $r$  and  $q$  are positive coprime integers and  $q \neq 0$ . Find  $r \cdot q^{-1}$  modulo 998 244 353.

### Input

The first line contains an integer  $t$  ( $1 \leq t \leq 2112$ ), the number of test cases. The test cases follow. Each test case is described by a single line containing two integers  $k$  and  $p$  ( $k, p \geq 1$ ;  $p \cdot k \leq 10^6$ ). The total sum of  $p \cdot k$  over all test cases does not exceed  $10^6$ .

### Output

For each test case, print a single line containing the integer  $r \cdot q^{-1} \bmod 998\,244\,353$ : the result of the calculation.

### Example

<i>standard input</i>	<i>standard output</i>
3	818
2 3	204495126
1 10	16726290
9 6	