

P5. Calculator Conundrum

(Time Limit: 3 seconds)

Alice got a hold of an old calculator that can display n digits. She was bored enough to come up with the following time waster.

She enters a number k then repeatedly squares it until the result overflows. When the result overflows, only the n most significant digits are displayed on the screen and an error flag appears. Alice can clear the error and continue squaring the displayed number. She got bored by this soon enough, but wondered:

“Given n and k , what is the largest number I can get by wasting time in this manner?”

Input

The first line of the input contains an integer t ($1 \leq t \leq 200$), the number of test cases. Each test case contains two integers n ($1 \leq n \leq 9$) and k ($0 \leq k < 10^n$) where n is the number of digits this calculator can display k is the starting number.

Output

For each test case, print the maximum number that Alice can get by repeatedly squaring the starting number as described.

Sample Input

```
2
1 6
2 99
```

Sample Output

```
9
99
```

P6. Coin Collector

(Time Limit: 3 seconds)

Our dear Sultan is visiting a country where there are n different types of coin. He wants to collect as many different types of coin as you can. Now if he wants to withdraw X amount of money from a Bank, the Bank will give him this money using following algorithm.

```
withdraw(X){  
    if( X == 0) return;  
    Let Y be the highest valued coin that does not exceed X.  
    Give the customer Y valued coin.  
    withdraw(X-Y);  
}
```

Now Sultan can withdraw any amount of money from the Bank. He should maximize the number of different coins that he can collect in a single withdrawal.

Input

First line of the input contains T the number of test cases. Each of the test cases starts with n ($1 \leq n \leq 1000$), the number of different types of coin. Next line contains n integers C_1, C_2, \dots, C_n the value of each coin type. $C_1 < C_2 < C_3 < \dots < C_n < 1000000000$. C_1 equals to 1.

Output

For each test case output one line denoting the maximum number of coins that Sultan can collect in a single withdrawal. He can withdraw infinite amount of money from the Bank.

Sample Input

```
2  
6  
1 2 4 8 16 32  
6  
1 3 6 8 15 20
```

Sample Output

```
6  
4
```