

Problem X: _____ DOLLARS

7+5+7+8=27 Points

Problem ID: unlucky

Rank: 2+3+3+4

Introduction

It's Chinese New Year! Your [crazy rich asian](#) parents gave you a [blank cheque](#) to motivate you to not marry out of wealth this year, but you have other ideas. With this cheque, you can ask for however much money you want, as long as the number you write fits on the paper!

However, your parents are very superstitious when it comes to numbers. There are lots of numbers they believe to be unlucky. For example, 4 is unlucky because the pronunciation sounds like death in Chinese (compare [四 sì](#) and [死 sì](#)). 666 is also unlucky because it's the [number of the beast](#). As they don't want to risk sending any misfortune, they refuse to send cheques containing any unlucky numbers.

You ask your parents for a list of all the numbers they consider unlucky. What's the largest amount of money you can give to your ~~broke~~ significant other without including any of these numbers?

Problem Statement

Given a list L of N unlucky numbers L_1, L_2, \dots, L_N , find the largest D digit number that does not contain any unlucky number as a substring.

The digit 1 is guaranteed to never be present in any unlucky number.

Input Format

The first line of the input contains an integer T denoting the number of test cases that follow.

For each test case:

- The first line contains two space-separated integers N D , where:
 - N denotes the length of L , the number of unlucky numbers.
 - D denotes the number of digits in the number you want to find.
- The second line contains N space-separated integers L_1, L_2, \dots, L_N , denoting the list of unlucky numbers.

Output Format

For each test case, output a single line containing a single integer with D digits, your answer.

Constraints

Time Limit: **2 seconds** (This is twice the time of a typical problem because of larger inputs!)

$$1 \leq L_i < 10^D$$

The digit 1 is guaranteed to never be present in any L_i .

The total number of digits in L across all test cases in an input file does not exceed 10^6 .

Main Test Set

$$1 \leq T \leq 100$$

$$1 \leq N \leq 10$$

$$1 \leq D \leq 4$$

Bonus Test Set 1

$$1 \leq T \leq 100$$

$$1 \leq N \leq 20$$

$$1 \leq D \leq 20$$

Bonus Test Set 2

$$T = 1$$

$$1 \leq N \leq 5000$$

$$1 \leq D \leq 5000$$

Bonus Test Set 3

$$T = 1$$

$$1 \leq N \leq 20000$$

$$1 \leq D \leq 20000$$

Sample Test Cases

Main Sample Input

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```
4
4 3
7 88 89 99
5 3
4 878 9 88 666
8 4
2 3 4 5 6 7 8 9
10 4
754 9 8 77 69 6 57 537 4 55
```

Main Sample Output

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```
986
877
1111
7535
```

Main Sample Explanations

For test case #1, we want to find a $D = 3$ digit number that does not contain any of the following $N = 4$ unlucky numbers: 7, 88, 89, and 99. We know 986 is the largest valid number because we can show that all 3 digit numbers larger than it contain at least one unlucky number:

987 contains 7.	992 contains 99.	997 contains 99 and 7.
988 contains 88.	993 contains 99.	998 contains 99.
989 contains 89.	994 contains 99.	999 contains 99 twice.
990 contains 99.	995 contains 99.	
991 contains 99.	996 contains 99.	

For test case #2, 877 is the largest 3 digit number that does not contain 4, 878, 9, 88, or 666. Note that unlucky numbers in the list may not be sorted.

For test case #3, all digits except 1 are unlucky. Therefore, our answer must contain only 1s.

Bonus 1 Sample Input

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```
2
10 20
8778 687778686 778768777 777877 687778685 88 878 9 87778687 76877787
10 20
8578578 9 878578577 88 787 857857687 7858 786 57857785 8578576868
```

Bonus 1 Sample Output

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```
87778768776877786848
87857857686785785778
```