Slot Machine

Input file:	*standard input*
Output file:	*standard output*
Time limit:	8 seconds
Memory limit:	1024 mebibytes

Little Misha is sitting in front of a slot machine and wants to win the jackpot. The machine has k slots forming a string of length k. Each slot can show any decimal digit or a question mark. Initially, each slot shows a question mark.

The machine also keeps a secret string consisting of k decimal digits. It is possible that not any decimal string of length k can be stored by it: Misha found a manual for this slot machine, and in chapter 007, all possible secret strings are listed. To win the jackpot, the player needs to make the k slots exactly match the secret string and press a big red button afterwards. However, when the button is pressed, if the displayed string is different from the secret one, the machine converts both the secret string and the string formed by the k slots into two integers (possibly with leading zeros) and tells the player which one of them is greater than the other. Note that if at least one of the slots shows a question mark when the big red button is pressed, then the machine says nothing instead.

Misha can press the button any number of times. Before the first press and between any two presses, he can also choose any number of slots and change the symbols in those slots (question marks or digits) into any other symbols. There is one caveat: for each replacement of a symbol, Misha has to pay one ruble. He doesn't want to anger his mom, so he tries to spend as little as possible. How much is guaranteed to suffice?

Input

The first input line contains an integer T, the number of test cases ($1 \le T \le 10^4$). Then descriptions of T test cases follow.

The first line of a test case description contains k, the number of slots ($1 \le k \le 5$). The second line contains a binary sequence s of length 10^k. For each $i \in \{0, 1, \ldots, 10^k - 1\}$, the value $s_i = 0$ means that number i could not be the secret string, while $s_i = 1$ means that number i is allowed by the manual and could be stored by the machine. There is at least one i such that $s_i = 1$.

The total length of all strings does not exceed 10^5.

Output

Print one integer: the smallest amount of money (in rubles) that is enough for Misha's victory.

Example

standard input	standard output
2 1 1110001010 1 1111111111	3 4