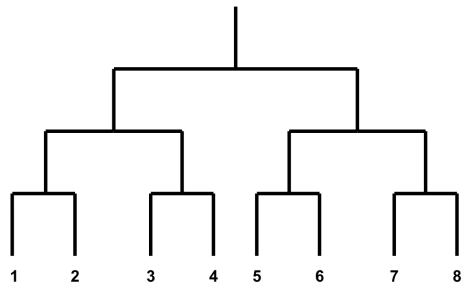
M: Tournament Rigging

Time Limit: 1 second

There is a single-elimination tournament where players compete in 1-on-1 matches. The full bracket is known in advance. All of the players are sufficiently well known that for each pair of players, you know which player would win in a fair 1-on-1 match. However, you also know that everyone has their own price, and thus you know how much of a bribe each player would require in order to intentionally lose a match.



Before any given match, you can either do nothing or give a bribe to one of the participants. If you do nothing, the match will be fair. Otherwise, the person who was bribed will lose.

What is the minimum total amount of money you would need to invest in bribes in order to ensure that player 1 wins the entire tournament?

Input

The first line of input contains a single integer T ($1 \leq T \leq 1024$), representing the number of test cases.

The descriptions of T test cases follow. Each test case starts with a line containing a single integer k ($1 \leq k \leq 11$), denoting that there are 2^k players, numbered from 1 to 2^k. The bracket is set up in order of the players, so the first round matches player 1 against player 2, player 3 against player 4, etc., and the next round matches the winner among (1, 2) against the winner among (3, 4), etc.

The next 2^k lines each describe one player, in order from player 1 to player 2^k. Each line contains an integer b ($1 \leq b \leq 10^6$) and a string s ($|s| = 2^k$) of 0s and 1s, where b is the cost to bribe this player and the i^{th} character of s is 1 if and only if this player would win against player i in a fair match.

For each player i, the i^{th} character of player i's string is 0. For each pair of distinct players i and j, exactly one of the following is true: the j^{th} character of player i's string is 1, or the i^{th} character of player j's string is 1.

The sum of 2^k over all test cases will not exceed 2048.

Output

For each test case, output the minimum total cost of bribes needed to ensure that player 1 wins the entire tournament.

Sample Input 1	Sample Output 1
3 1 3 00 5 10 2 3 0110 1 0011 4 0001 1 1000 3 9 01010101 6 00111111 4 10011111 8 00001111 100 10000110 2 00000011 3 10000001 5 00001000	5 0 7