

Problem I Binary Polynomials

Input File: I.IN Output File: standard output Program Source File: I.PAS or I.C or I.CPP or I.JAVA

Each mapping *f* of the set $\{0,1\}^n$ of *n*-dimensional binary vectors to $\{0,1\}$ is called Boolean function of *n* variables and denoted by $f(x_n, x_{n-1,...,} x_1)$. For cryptography some properties of the Boolean functions are interesting. Let denote by B(n,k) the set of *n*-dimensional binary vectors that have *k* 1's. The task is for given Boolean function *f* to find the number of vectors $(b_n, b_{n-1,...,} b_1)$ from B(n,k) such that $f(b_n, b_{n-1,...,} b_1)=1$.

The Boolean function will be given by its (unique) **polynomial modulo 2**. In these polynomials the operations addition and multiplication modulo 2 are used, defined as shown in the tables of Fig. 1. In the polynomial of a function any product of *m* variables $x_{i_1}x_{i_2} K x_{i_m}$ could participate or not participate. So the general form of the polynomial for *n* variables is:

 $a_0 + a_1 x_1 + a_2 x_2 + a_3 x_2 x_1 + a_4 x_3 + a_5 x_3 x_1 + a_6 x_3 x_2 + a_7 x_3 x_2 x_1 + \dots + a_N x_n x_{n-1} x_1$

where all coefficients a_j , $j=0,1,...,N=2^n-1$, are 0's or 1's and if the coefficient is equal to 0 we will omit the corresponding product and if it is equal to 1 we just will omit the coefficient. For example, the polynomial of the Boolean function disjunction of 2 variables given on Fig. 2 is $0+1.x_1+1.x_2+1.x_2x_1=x_1+x_2+x_2x_1$.

+	0	1		*	0	1		x2	x1	f
0	0	1		0	0	0		0	0	0
1	1	1		1	0	1		0	1	1
			-				-	1	0	1
								1	1	1
			Fig. 1						Fig. 2	

Your program has to be ready to solve more than one test case. The first line of the input file will contains only the number T of the test cases. Each of the following T lines will describe one function – first the numbers n and k separated by single space $(1 \le n \le 18, 0 \le k \le n)$ and then, separated by one more space a string of 2^n 0's and 1's that are the coefficients of the corresponding polynomial, ordered as in the general form of the polynomial given above.

The output file have to contain T lines with a single number each – the number of vectors found by your program.

EXAMPLE

Input	Output
3	2
2 1 0111	6
4 2 10000000000000	0
5 3 00000000000000000000000000000000000	