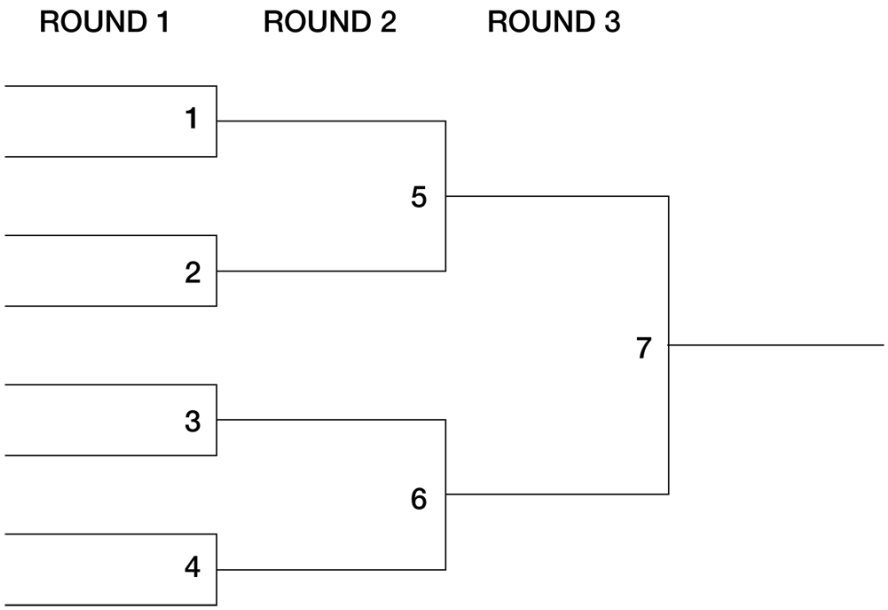
F. TONTON AND THE TOURNAMENT

Time limit: 1s | Memory limit: 512MB
Input stream: stdin | Output stream: stdout

The school of Tonton has organized a marathon tournament to select three candidates for ACM ICPC World Final 2019. The tournament consists of several tests including IQ test, Beauty test, etc. Candidates have passed most of the tests, and nearly entering the final test. Before the final test, each candidate already got a score s_i from previous tests. The rule of final test is single elimination. There are $n = 2^k$ candidates competing through k round (See the format below for $k = 3$)



A candidate winning in each round will receive point. The longer survival, the point is rewarded bigger. It means that rewarding point for round 2 will be greater than or equal to that of round 1; round 3's is greater than or equal to round 2's, etc. After round k^{th}, candidates will be ranked by their scores. Rank 1 should have the highest score, rank 2 has the second highest score, etc. Candidates, who have the same score, have the same rank. In other words, a candidate has rank r if and only if there are exact $r - 1$ other candidates who have strictly more points than him/her. For example, for five candidates with score $\{5, 5, 4, 4, 1\}$, their ranks are $\{1, 1, 3, 3, 5\}$.

Your task is to count how many situations of the final test that the candidate x^{th} is on top 3. (i.e. his/her rank is either 1, 2 or 3). There are $2^{number\ of\ match} = 2^{n-1}$ situations of the final test. Since the answer can be very large, you should print it modulo $10^9 + 7$.

Input

- The first line contains two integer k and x ($1 \leq x \leq 2^k$, $1 \leq k \leq 14$)
- The second line contains $n = 2^k$ integers $s_1, s_2, \ldots, s_n$ – score of each candidate before entering the final test

- The third line contains k integers $r_1, r_2, \ldots, r_k$– rewarding points for each round ($1 \leq r_1 \leq r_2 \leq \cdots \leq r_k \leq 10^9$)

Output

- Print the number of satisfied situations modulo $10^9 + 7$ in one line.

Sample

Input	Output
2 1 1 2 2 2 2 2	4