Linear Feedback Shift Register

Given a Fibonacci linear feedback shift register (LFSR) please emulate its behaviour.

Input

First $t<100$, the number of test cases. In each of the following t lines:
$1<l<=1024$ - the length of the register (the number of bits),
seed - the initial value of the LFSR in binary format,
$0<p<l$ - the number of taps (bits which influence the input),
$p_1,p_2,...,p_p$ - the taps in increasing order in decimal format, $0<p_i<=l$.

Output

Please output, byte by byte, the first 128 output bits of the register in hexadecimal format.

Example

Input:
2
3 010 2 2 3
5 00110 3 1 3 5

Output:
A7 D3 E9 74 3A 9D 4E A7 D3 E9 74 3A 9D 4E A7 D3
85 9B C2 4D E1 A6 70 53 B8 29 DC 14 6E 0A 37 85

Scoring

By solving this problem you score 10 points.