

Problem I. Simple Math 4

Input file: **standard input**
Output file: **standard output**
Time limit: 9 seconds
Memory limit: 512 megabytes

Given nonnegative integers N, L, R and X , find the maximum value of $\sum_{i=1}^N A_i$ over all possible integer arrays A of length N satisfying

- $\bigoplus_{i=1}^N A_i = X$, where $\oplus$ denotes the exclusive-or operation.
- $\forall 1 \leq i \leq N, L \leq A_i \leq R$.

If there exists no valid array A satisfying above requirements, output -1 .

Input

The first line contains a single integer T ($1 \leq T \leq 3000$), denoting the number of test cases.

For each test case, there is a line containing integers N, L, R, X ($1 \leq N \leq 10^9, 0 \leq L \leq R \leq 10^9, 0 \leq X \leq 10^9$).

Output

For each test case, output an integer in a line, denoting the answer.

Example

standard input	standard output
1 5 890 970 768	4756