Lab7 Questions

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Lab7.A: Code

- **Gray Code** is an interesting ordering of the binary numeral system such that two successive values differ in only one bit (binary digit).
- Given N, output the N^{th} Gray Code **WITHOUT** leading zeros (It is guaranteed that $N \geq 1$, so you do not need to worry about $N = 0$).

In the standard encoding the least significant bit follows a repetitive pattern of 2 on, 2 off (… 11001100 …); the next digit a pattern of 4 on, 4 off; the *n*th least significant bit a pattern of 2^n on 2^n off. The four-bit version of this is shown below:

Decimal	Binary	Gray				Decimal of Gray
0	0000	0	0	0	0	0
1	0001	0	0	0	1	1
2	0010	0	0	1	1	3
3	0011	0	0	1	0	2
4	0100	0	1	1	0	6
5	0101	0	1	1	1	7
6	0110	0	1	0	1	5
7	0111	0	1	0	0	4
8	1000	1	1	0	0	12
9	1001	1	1	0	1	13
10	1010	1	1	1	1	15
11	1011	1	1	1	0	14
12	1100	1	0	1	0	10
13	1101	1	0	1	1	11
14	1110	1	0	0	1	9
15	1111	1	0	0	0	8

the least significant bit 2 on 2 off

the 2nd least significant bit 4 on 4 off

the 3rd least significant bit 8 on 8 off

the 4th least significant bit 16 on 16 off

Lab7.B: Hot Spring

- Once there was a magic hot spring. Whoever steeped inside gains happiness ---- or suffering as well.
- The hot spring is only available at moment $1, 2, \ldots, N$. The water changes every moment. If someone is enjoying the hot spring at moment i, he or she will gain v_i "happiness". Note that a negative v_i means he or she actually gains suffering.
- A visitor has only one chance to enjoy the hot spring. He or she may start enjoy the hot spring at some moment l, and finishes at some moment r $(l \leq r)$. The visitor's final happiness will be $\sum_{i=l}^{r} v_i$. However, if a visitor does not use the hot spring at all, the final happiness will be $-\infty$.
- Now there are Q visitors. The i^{th} visitor arrives at moment L_i and must leave at the end of moment R_i. Within their own time limits, visitors can choose the moments they want to enjoy the hot spring.
- Help each visitor find his or her maximal happiness.

Sample Input

5
1 7 -3 -4 5
3
3 4
2 5
1 5

1	2	3	4	5
1	7	-3	-4	5

3 4

3 3 → -3
3 4 → -7
4 4 → -4

-3

1	2	3	4	5
1	7	-3	-4	5

2 2 →7
2 3 →4
2 4 →0
2 5 →5
3 3 →-3
3 4 →-7
3 5 →-2
4 4 →-4
4 5 →1
5 5 →5

7

1	2	3	4	5
1	7	-3	-4	5

1 5

2 2 →7	1 1 →1
2 3 →4	1 2 →8
2 4 →0	1 3 →5
2 5 →5	1 4 →1
3 3 →-3	1 5 →6
3 4 →-7	
3 5 →-2	
4 4 →-4	
4 5 →1	
5 5 →5	

→ **8**

Sample Output

-3
7
8