

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

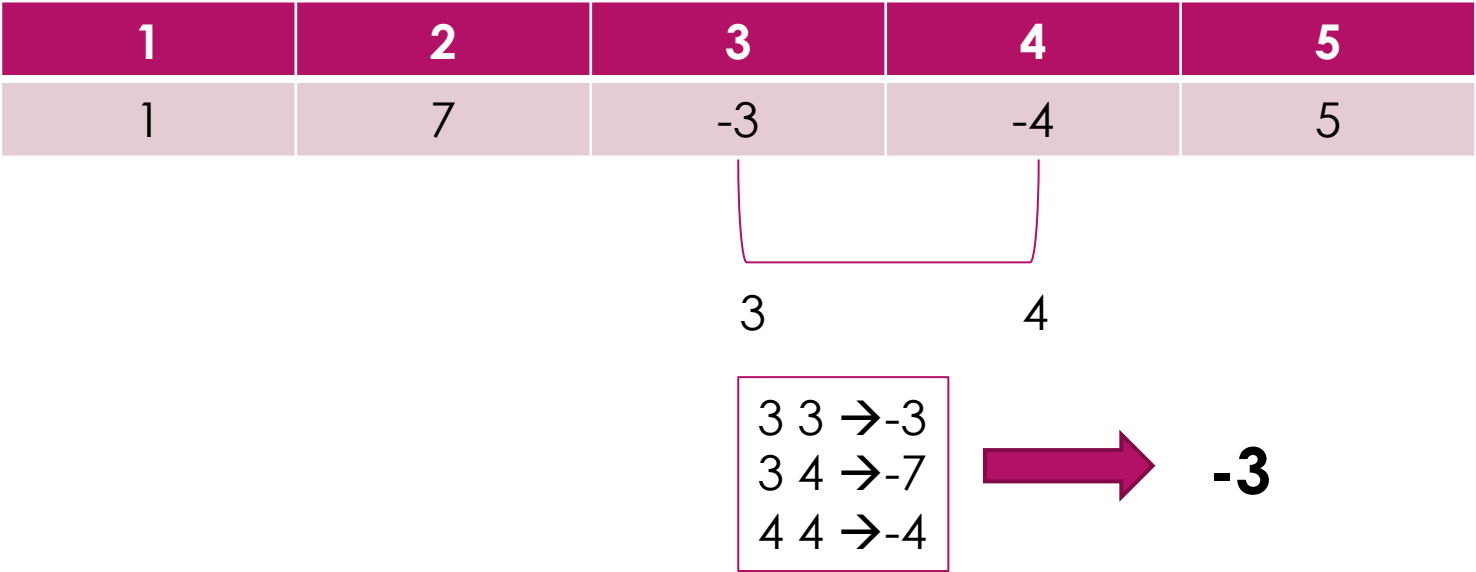
the 4th least significant bit 16 on 16 off

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 $1, 2, \dots, N$. 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



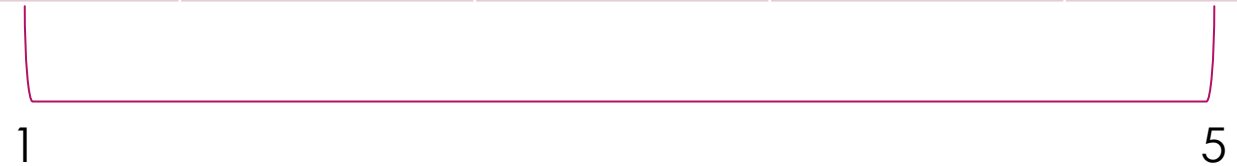
1	2	3	4	5
1	7	-3	-4	5

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



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