Northwestern European Regional Contest 2017

NWERC 2017 Practice

Bath, November 25

Problems

A Abbey Courtyard
B Broken Gearbox
C Cube Bits

Do not open before the contest has started.

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Problem A
Abbey Courtyard
Time limit: 1 second

Bath's annual Christmas market runs from the 23rd of November 2017 until the 10th of December 2017. During this time, the market will occupy the entire square courtyard of Bath Abbey.

To brighten things up at night, a single long strand of cheerful festive lights will be run along all four equally-long edges of the courtyard.

You will be in charge of buying the electrical wiring to which the lights will be affixed. How much will you need to use to outline the whole Christmas market with festive lights?

The Christmas market. Photo by Roy Hughes

Input

The input consists of:

- One line with an integer a ($1 \leq a \leq 10^{18}$), the area in square metres of the yard.

Output

Output the total length of electrical wiring needed for the market, in metres. The length should be accurate to an absolute or relative error of at most 10^{-6}.

Sample Input 1	Sample Output 1
64	32.0

Sample Input 2	Sample Output 2
1234	140.51334456

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Problem B
Broken Gearbox
Time limit: 2 seconds

Several interlocking gears. cc by-sa by Thomas Claveirole

The mechanical Turk was an 18th-century sham robot designed to give the illusion of artificial intelligence by playing chess. More importantly, the Turk inspired us to make our own fake robot that gives the illusion of real intelligence by solving programming contest problems.

We put some gears on axles inside an uncovered panel to make our machine look more realistic. Since the gears are just for visual effect, they have been placed so as to create an impressive meshing pattern; however, the placement is without any regard to gear ratios or turning direction, so it is possible that none of the gears can really move.

It is guaranteed that every axle was connected to every other axle by meshing, either directly or indirectly. Two axles a and b are said to have directly meshing gears if their distance from one another is equal to the sum of the radii of their gears ($d_{ab} = r_{g_a} + r_{g_b}$).

Sadly, the gears fell off our machine. We think we collected all of them back up again, but now we are not sure which should go back on which axle. Please find a way of putting the gears on the axles to make them mesh the way they did originally.

Input

The input consists of:

- One line with an integer n ($2 \leq n \leq 10^5$), the number of gears and axles.
- One line with n integers $r_1 \ldots r_n$ ($1 \leq r_i \leq 10^8$ for each i), the radius of each gear.
- One line with an integer m ($n - 1 \leq m \leq 10^5$), the number of pairs of axles to mesh.
- m lines with three integers a_i, b_i, d_i ($1 \leq a < b \leq n$; $1 \leq d \leq 10^8$), the indices of two axles that were previously meshed, and the distance between them, respectively.

Output

If the machine can be fixed with the given gears, give any one valid matching by outputting n integers $g_1 \ldots g_n$, where g_i is the 1-based index of the gear to put on the i-th axle. Otherwise, output "`impossible`".

Sample Input 1	Sample Output 1
4 20 10 5 15 4 1 2 15 2 3 30 3 4 35 1 4 20	3 2 1 4

Sample Input 2	Sample Output 2

<pre>6
10 55 80 5 60 50
6
2 4 60
3 4 65
4 5 90
1 6 65
5 6 85
1 4 70</pre>
	<pre>5 6 2 1 3 4</pre>

Sample Input 3	Sample Output 3

<pre>4
1 2 1 1
4
1 4 3
2 4 3
3 4 3
1 3 2</pre>
	<pre>3 1 4 2</pre>

Sample Input 4	Sample Output 4

<pre>3
3 4 5
2
1 2 7
1 3 7</pre>
	<pre>impossible</pre>

Problem C
Cube Bits
Time limit: 4 seconds

A confused server. Photo by Jason Scott

The new computers are here! However, we made a mistake during the order: we thought we were ordering machines with qubits; in fact, we ordered several hundred computers powered by cube-bits.

The programs and data we had ready were prepared in base 10. To feed the data into the new computer, which uses a cubic system of counting, we will need to convert it to base 3 first.

Write a program to convert a stream of decimal numbers into ternary format, so they fit the new system's input bus.

Input

The input consists of:

- One line with an integer n ($1 \leq n \leq 10^6$), the size of the data stream.
- n lines with one decimal integer v_i ($0 \leq v < 3^{20}$), the decimal representation of the i-th integer in the data stream.

Output

Output n lines, giving the numbers converted to base-3, in the same order as given. In the interest of conserving disk space, do not print leading zeroes.

Sample Input 1	Sample Output 1
4 12 14 13 15	110 112 111 120

Sample Input 2	Sample Output 2
2 2147483648 3486784400	12112122212110202102 22222222222222222222

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