J Jacobi Numbers

Time limit: 1s

Today, a new paper has been published in the *Bulletin of Apocryphal Pioneers in Computation*. According to this paper, the forgotten German number theorist Wahnfried Imaginus Jacobi (1806–1853), while still a secondary student in Potsdam, investigated the decomposition of integers into sums of cubes. Among the examples noted in the surviving fragments of his notebooks are

$$2025 = 1^3 + 2^3 + 3^3 + 4^3 + 5^3 + 6^3 + 7^3 + 8^3 + 9^3$$

and the more curious expression

$$3 = 1^3 + 1^3 + 1^3 = 4^3 + 4^3 + (-5)^3\,,$$



Carl Gustav Jacob Jacobi (1804–1851), famous brother of Wahnfried Imaginus. Public domain on Wikimedia Commons

which shows that a solution need not be unique. Jacobi restricted his attention to small integers and probably did not know the decomposition

$$3 = 569\,936\,821\,221\,962\,380\,720^3 + (-569\,936\,821\,113\,563\,493\,509)^3 + (-472\,715\,493\,453\,327\,032)^3\,,$$

which was discovered only recently.[4] However, Jacobi did manage to prove that a decomposition into cubes always exists for all positive integers up to 9241, the 28th cuban prime of the first kind. Although his work was never published, references to the method appear in a marginal annotation in an 1823 letter to his famous brother Carl Gustav Jacob.

Given a positive integer n, output a list of at most 10 000 integers between $-10\,000$ and 10 000 such that the sum of their cubes equals n.

Input

The input consists of:

- One line with an integer n ($1 \leq n \leq 9241$), the number to decompose into cubes.

Output

Output an integer k ($1 \leq k \leq 10\,000$), the number of terms in your solution, followed by k integers $a_1, \ldots, a_k$ ($-10\,000 \leq a_i \leq 10\,000$ for each i), such that $a_1^3 + \cdots + a_k^3 = n$.

If there are multiple valid solutions, you may output any one of them.

Sample Input 1	Sample Output 1
2025	9 1 2 3 4 5 6 7 8 9

[4] Booker, Andrew R.; Sutherland, Andrew V. (2021), "On a question of Mordell", *Proceedings of the National Academy of Sciences*, **118** (11)

Sample Input 2	**Sample Output 2**
45	3 2025 -2369 1709

Sample Input 3	**Sample Output 3**
15	3 -1 2 2

Sample Input 4	**Sample Output 4**
9241	2 -55 56