Project Euler #103: Special subset sums: optimum

HackerRank

This problem is a programming version of Problem 103 from projecteuler.net

Let $S(A)$ represent the sum of elements in set A of size n. We shall call it a special sum set if for any two non-empty disjoint subsets, B and C, the following properties are true:

i. $S(B) \neq S(C)$; that is, sums of subsets cannot be equal.
ii. If B contains more elements than C then $S(B) > S(C)$.

If $S(A)$ is minimised for a given n, we shall call it an optimum special sum set. The first five optimum special sum sets are given below.

$$n = 1 : \{1\}$$
$$n = 2 : \{1, 2\}$$
$$n = 3 : \{2, 3, 4\}$$
$$n = 4 : \{3, 5, 6, 7\}$$
$$n = 5 : \{6, 9, 11, 12, 13\}$$

It *seems* that for a given optimum set, $A = \{a_1, a_2, \cdots, a_n\}$, the next optimum set is of the form $B = \{b, a_1 + b, a_2 + b, \cdots, a_n + b\}$, where b is the "middle" element on the previous row.

By applying this "rule" we would expect the optimum set for $n = 6$ to be $A = \{11, 17, 20, 22, 23, 24\}$, with S(A) = 117. However, this is not the optimum set, as we have merely applied an algorithm to provide a near optimum set. The optimum set for $n = 6$ is $A = \{11, 18, 19, 20, 22, 25\}$, with $S(A) = 115$.

Let's call the sets obtained by the algorithm above continuously the near-optimal sets. What is the near-optimal set of the size N?

Input Format

The only line containing the number N where $1 \leq N \leq 10^6$

Output Format

The only line containing N numbers separated by spaces which are the members of the set in ascending order. As the numbers could be huge output them modulo 715827881.

Sample Input

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6
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Sample Output

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11 17 20 22 23 24
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