CCO '13 P1 - All Your Base Belong to Palindromes

Time limit: 1.0s **Memory limit:** 1G

Canadian Computing Competition: 2013 Stage 2, Day 1, Problem 1

Most of the time, humans have 10 fingers. This fact is the main reason that our numbering system is base-10: the number 257 really means $2 \times 10^2 + 5 \times 10^1 + 7 \times 10^0$. Notice that each digit in base-10 is in the range from $0 \ldots 9$.

Of course, there are other bases we can use: binary (base-2), octal (base-8) and hexadecimal (base-16) are common bases that really cool people use when trying to impress others. In base-b, the digits are in the range from $0 \ldots b-1$, with each digit (when read from right to left) being the multiplier of the next larger power of b.

So, for example 9 (in base-10) is:

- 9 in base-16
- 11 in base-8 ($1 \times 8^1 + 1 \times 8^0 = 9$)
- 1001 in base-2 ($1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 = 9$)

Noticing the above, you can see that 9 is a palindrome in these three different bases. A *palindrome* is a sequence which is the same even if it is written in reverse order: English words such as `dad`, `mom`, and `racecar` are palindromes, and numbers like 9, 11, and 1001 are also palindromes.

Given a particular number X (in base-10), for what bases b ($2 \leq b \leq X$) is the representation of X in base-b a palindrome?

Input Specification

There will be one line, containing the integer X ($2 \leq X \leq 10^9$).

For test cases worth 80% of the points, you may assume $X \leq 10^4$.

Output Specification

The output should consist of a sequence of increasing integers, each on its own line, indicating which bases have the property that X written in that base is a palindrome. Note that we will only concern ourselves with bases which are less than X, and that the first possible valid base is 2.

Sample Input

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9
```

Output for Sample Input

```
2
8
```

Explanation of Output for Sample Input

The number 9 was shown to be a palindrome in base-2 and in base-8 in the problem description. The other bases do not lead to palindromes. For example, in base-3, 9 is expressed as 100, and in base-5, 9 is expressed as 14.