2_隨機序列 - Random Sequence Generator

(10分)

問題敘述

小宏最喜歡隨機數列了！他使用的數字系統是 N-進位的系統，位數由十進位的 0 到 $N-1$ 表示。他總是喜歡自己在紙上自己嘗試生出隨即的數列。他生隨機數列的規則是：每一個數字都要出現一樣的次數。然而，他最近發現這個規則生出來的數列並不是非常的隨機。舉例來說，對於 $N=10$，有這些符合他的規則，但是不怎麼隨機的數列。

- `0123456789`
- `01234567890123456789`
- `00011122233344455566677788899`

所以呢，他制定了一個新的規則：對於每兩個**相鄰**的數字，他們的出現次數也要相同！譬如說，出現 `00`、`10`、`71`、`22` 的次數都要相同。請幫小宏生出一個符合他的新規定的隨機數列吧！他也不希望你生出來的序列太長，所以請限制輸出的序列長度不超過 10^6。請注意，他第一個規則已經作廢，所以新的序列的每一個數字的出現次數**不一定**要相同。

保證在給定的輸入範圍中，一定存在至少一個符合條件的解答。

輸入格式

輸入僅有一個數字 N（$2 \leq N \leq 500$），代表小宏使用 N-進位的數字系統。

輸出格式

第一行請輸出一個數字 K，代表你的序列的長度。第二行請輸出 K 個空白分開的數字 x_i，代表所生的隨機數列。

請滿足：

- $2 \leq K \leq 10^6$
- 對於所有的 $1 \leq i \leq K$，都有 $0 \leq x_i < N$
- 序列中所有相鄰元素的出現次數都相同

於眾多可能的答案中，輸出任何一解即可。

資料範圍

- $1 \leq N \leq 500$

輸入範例 1

```
2
```

輸出範例 1

```
9
0 0 0 1 1 0 1 1 0
```

輸入範例 2

```
3
```

輸出範例 2

```
19
0 0 0 1 0 2 1 0 1 1 1 2 2 0 2 1 2 2 0
```

輸入範例 3

```
4
```

輸出範例 3

```
33
0 0 0 1 0 2 0 3 1 0 1 1 1 2 1 3 2 0 2 1 2 2 2 3 3 0 3 1 3 2 3 3 0
```

範例說明

對於第一筆範例側資，00、01、10、11 都各出現了兩次。

對於第二筆範例側資，00、01、02、10、11、12、20、21、22 皆出現了兩次。請注意，這並不是最佳解：長度為 10 的 `0011220210` 也可以是答案。

2_Random Sequence Generator

(10 points)

Description

Ryan loves generating random number sequences! He uses a base-N numbering system where digits are marked with 0 to $N-1$ in decimal. His rule for generating random sequences is that all digits must appear with the same frequency. However, he's noticed that his rule doesn't hold much water: when $N=10$, non random-looking sequences which follow his rules like these appear:

- `0123456789`
- `01234567890123456789`
- `00011122233344455566677788899`

Therefore, he's come up with a new rule: that all two neighbouring digits must too appear with the same frequency! In this case, combinations such as `71`, `22`, `00`, `07` must appear with the same frequency. Can you write a program to generate such a sequence? Note that he has now completely ignored the first rule - the digits do **not** have to appear with the same frequency.

In addition, Ryan does not like his sequences to be too long - your generated sequence must not exceed 10^6 elements.

It can be proved that such a sequence always exists for the given input range.

Input Format

There is only one integer N ($2 \leq N \leq 500$) on the first line, which denotes the base system Ryan uses.

Output Format

On the first line, please output a number K denoting the length of your sequence. Then on the second line, output K space-separated numbers x_i denoting the elements of the sequence.

Your sequence must satisfy the following requirements:

- $2 \leq K \leq 10^6$;
- For all $1 \leq i \leq K$, $0 \leq x_i < N$;
- All consective two elements appear with the same frequency.

Any solution satisfying the above constraints will be judged as correct.

Constraints

- $1 \leq N \leq 500$

Input Example 1

```
2
```

Output Example 2

```
9
0 0 0 1 1 0 1 1 0
```

Input Example 2

```
3
```

Output Example 2

```
19
0 0 0 1 0 2 1 0 1 1 1 2 2 0 2 1 2 2 0
```

Input Example 3

```
4
```

Output Example 3

```
33
0 0 0 1 0 2 0 3 1 0 1 1 1 2 1 3 2 0 2 1 2 2 2 3 3 0 3 1 3 2 3 3 0
```

Example Explanation

For the first test, 00, 01, 10, 11 all appear twice.

For the second test, 00, 01, 02, 10, 11, 12, 20, 21, 22 also all appear twice. Note that this is not the shortest or the only answer: you might also find `0011220210`, which has length 10.