General Note:

- The test consists of two questions. Read and understand the questions carefully.
- The design mark distribution for each function is given next to it. Write the design only for those functions.
- For implementations, you are permitted to use the code that you have submitted as an assignment.
- Use of global variable and/or static variable is NOT permitted.
- Assume that all the inputs in the test cases are valid.

1. A secret message has to be communicated between two military groups. The message is a sentence and to ensure secrecy, a hashing technique is used to store the words in the message in a hash table of size n with separate chaining.

   For each word in the sentence, the given hash functions are applied separately to obtain two positions, and the corresponding word is then stored in one of these two positions. The hash functions for a word w are defined as follows:

$$h(w) = \begin{cases} (2 * \text{ASCII of } w)\%\text{n} & \text{if } length(w) = 1 \\ \\ \lceil \text{sum of ASCII values of the first two letters} & \\ \text{and the last two letters in } w/length(w)\rceil\%\text{n} & \text{otherwise} \end{cases}$$

$$g(w) = \lfloor \text{sum of ASCII values of all the letters in } w/length(w)\rfloor\ \%\text{n}$$

   The word is stored in the hash table entry that has lesser number of words in the chain. If both the chains are of same length then the word is added to the chain in the position calculated by $h(w)$.

   Your program should implement the following functions as per the given function prototypes:

   - $store\_word(H, n, w)$: Store the word w in the hash table H of size n. [2 Marks]
   - $find\_hash1(w, n)$: Find and return the position of w in the hash table of size n using the hash function $h(w)$. [1 Mark]
   - $find\_hash2(w, n)$: Find and return the position of w in the hash table of size n using the hash function $g(w)$. [1 Mark]
   - $print\_table(H, n)$: In a separate line, print the words (separated by a space) stored in each chain, in the order they were inserted in the hash table H, from position 0 to position $n - 1$. If there are no words in the chain at a particular position in H, print NULL. [2 Marks]

Input Format

- First line of the input contains an integer $n \in [1, 10^5]$, the size of the hash table.
- Second line of the input contains the message of maximum length 10^5 with each word having a maximum length of 100.

Output Format

- Each of the n lines of the output should print the words stored in each chain in the hash table, separated by a space.
- If no words are present in the chain at a particular position, print NULL.

Sample Input and Output

Input 1

```
5
Southern war field deployed planC with soldiers of team SIX
```

Output 1

```
war planC
deployed with team SIX
soldiers
Southern field of
NULL
```

Input 2

```
3
Emergency points and Exit points updated in map E
```

Output 2

```
Emergency Exit E
points and points map
updated in
```