Program1

The string "PAYPALISHIRING" is written in a zigzag pattern on a given number of rows like this: (you may want to display this pattern in a fixed font for better legibility)

P A H N

A P L S I I G

Y I R

And then read line by line: "PAHNAPLSIIGYIR"

Write the code that will take a string and make this conversion given a number of rows:

string convert(string s, int numRows);

**Example 1:**

**Input:** s = "PAYPALISHIRING", numRows = 3

**Output:** "PAHNAPLSIIGYIR"

**Example 2:**

**Input:** s = "PAYPALISHIRING", numRows = 4

**Output:** "PINALSIGYAHRPI"

**Explanation:**

P I N

A L S I G

Y A H R

P I

**Example 3:**

**Input:** s = "A", numRows = 1

**Output:** "A"

**Constraints:**

* 1 <= s.length <= 1000
* s consists of English letters (lower-case and upper-case), ',' and '.'.
* 1 <= numRows <= 1000

Program 2

Given a pattern and a string s, find if s follows the same pattern.

Here **follow** means a full match, such that there is a bijection between a letter in pattern and a **non-empty** word in s.

**Example 1:**

**Input:** pattern = "abba", s = "dog cat cat dog"

**Output:** true

**Example 2:**

**Input:** pattern = "abba", s = "dog cat cat fish"

**Output:** false

**Example 3:**

**Input:** pattern = "aaaa", s = "dog cat cat dog"

**Output:** false

**Constraints:**

* 1 <= pattern.length <= 300
* pattern contains only lower-case English letters.
* 1 <= s.length <= 3000
* s contains only lowercase English letters and spaces ' '.
* s **does not contain** any leading or trailing spaces.
* All the words in s are separated by a **single space**.