

# H P C O D E W A R S X V I I

You climb the many stairs to the arena’s broadcast booth where the code-maker is again selling her creations. She continues to say her codes can’t be beat (only to be proven wrong.) This year, she has made her creations even more complex:

problem **19**  
**Serpentine Sentence**  
15 points

Serpentine Sentence: *Discover codes hiding around riddles. Leading a serpentine trail, I negate programmability. Use today!*

Hmph! She says she can’t be beaten by a program. You need to prove her wrong! We know that she tends to repeat herself, and she uses long sentences. So in each code she makes, we’ll find exactly 2 copies of the data, and it will be the longest repeated data we find. The sentence is written into a grid of characters in a serpentine fashion, moving up, down, left or right (not diagonally), and it never returns to touch its own path (that is, the sentence does not turn so that a later character is directly adjacent to an earlier one.) Somewhere else in the grid, the sentence is repeated in exactly the same way as the first, moving in exactly the same directions. The two copies may overlap each other. There may be other repeating sets of characters in the grid, but the longest paired repeat is the sentence we seek.

Your program must search the grid for the longest series of characters that can be found identically in two places. The longest possible length of the sentence is 80 characters.

## Input

The first line contains two integers X Y, representing the number of rows and columns in the data. Maximum of 20 rows and 50 columns. The next X lines include the coded message, Y characters at a time. It consists of letters and numbers (A-Z, a-z, 0-9), punctuation and spaces.

## Output

Print the discovered sentence. Since we can’t be sure in which order the characters appear, print it both forward and backward.

```
I like my Math with a slice of Pi.
.iP fo ecils a htiw htaM ym ekil I
```

This sentence is hidden in the grid in this way:

```
12 26
IAI my MatC76 Trombones le
 FkeCIDIch bin ein BerliId
wGiHIJtiw ImpressiverlInI
aIl IMhNIOI!edarap gib eht
nZ!aQR Invent! my Mat wriS
tITzUIaWX ofZkeYIZIAhIaCI?
 piz.E IJeA Pi.KLtiw MnX!a
I win slicIOPl IQhRSTUtVWz
76 Trombones leXI YZAB piz
Ich bin ein BIdCIaEI ofXII
ImpressiveHIer JK LIeB Pi.
!edarap gib ehtNISlicI win
```

```
my Mat
ke h
i tiw
l I h

my Mat
a of ke h
e Pi. tiw
slic l I h

a of
e Pi.
slic
```