Problem C

Secret Message

Jack and Jill developed a special encryption method, so they can enjoy conversations without worrying about eavesdroppers. Here is how: let L be the length of the original message, and M be the smallest square number greater than or equal to L. Add $(M - L)$ asterisks to the message, giving a padded message with length M. Use the padded message to fill a table of size KxK, where $K^2 = M$. Fill the table in row-major order (top to bottom row, left to right column in each row). Rotate the table 90 degrees clockwise. The encrypted message comes from reading the message in row-major order from the rotated table, omitting any asterisks.
For example, given the original message 'iloveyouJack', the message length is $L = 12$. Thus the padded message is 'iloveyouJack****', with length $M = 16$. Below are the two tables before and after rotation.

i	l	o	v
e	y	o	u
J	a	c	k
*	*	*	*

*	J	e	i
*	a	y	l
*	c	o	o
*	k	u	v

Then we read the secret message as 'Jeiaylcookuv'.

Input

The first line of input is the number of original messages, $1 \leq N \leq 100$. The following N lines each have a message to encrypt. Each message contains only characters a–z (lower and upper case), and has length $1 \leq L \leq 10000$.

Output

For each original message, output the secret message.

Examples

Input	Output
2 iloveyoutooJill TheContestisOver	loylloooJuv OsoTvtnheiterseC