Problem F

Sequence Decoding

(Time Limit: 1 second)

The amino acids in proteins are classified into two types of elements, hydrophobic (nonpolar) and hydrophilic (polar). Hydrophobic and hydrophilic are denoted by H and P respectively. A protein is represented by a sequence of H and P such as PPHHHPHPH. In order to reduce the representation length of a sequence, we use the notation $k[S]$ to denote the repeated sequence of k times sequence S, where $2 \leq k \leq 9$. A *legal sequence* is defined as following.

- A sequence consists of only one character 'H' or 'P' is a legal sequence.
- Let S_1 and S_2 be legal sequences. Then the sequence concatenated by S_1 and S_2 is also a legal sequence.
- Let S be a legal sequence. Then the sequence $k[S]$ is also a legal sequence, where $2 \leq k \leq 9$.

For example, PHPHPHPH is encoded as 4[PH]. Note that a repeated sequence may contains repeated sequences recursively such as 2[PH4[P]4[H]].

Given a nonempty encoded protein sequence S, your job is to expand S to its original sequence. That is, you should expand 2[PH4[P]4[H]] to PHPPPPHHHHPHPPPPHHHH.

Input Format

The first line is an integer n indicating the number of test cases. Each of the next n lines consists of a legal sequence composed by number digits '2'~'9', '[', ']', 'P' and 'H'.

Output Format

For each test case, output the expanding sequence in one line.

Technical Specification

- $1 \leq n \leq 10$.
- All the inputs are legal.
- The length of each input sequence is less than 50.
- The length of each expanded sequence is less than 1000.

Example

Sample Input:	Sample Output:
3 PHPHP 2[3[P]H2[P]] HH2[P3[H]]P	PHPHP PPPHPPPPPHPP HHPHHHPHHHP