

Transform the Expression

Transform the algebraic expression with brackets into RPN form (Reverse Polish Notation). Two-argument operators: +, -, *, /, ^ (priority from the lowest to the highest), brackets (). Operands: only letters: a,b,...,z. Assume that there is only one RPN form (no expressions like $a*b*c$).

Input

t [the number of expressions ≤ 100]
 $expression$ [length ≤ 400]
[other expressions]

Text grouped in [] does not appear in the input file.

Output

The *expressions* in RPN form, one per line.

Example

Input:

```
3
(a+(b*c))
((a+b)*(z+x))
((a+t)*((b+(a+c))^(c+d)))
```

Output:

```
abc*+
ab+zX+*
at+bac++cd+^*
```