

CS 251

Intermediate Programming

Infix to Postfix

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Spring 2025

Why convert infix to postfix?

- Easier to understand infix
- Easier to evaluate postfix

Shunting-yard Algorithm

- In a railroad shunting-yard, railroad cars are separated and rearranged onto several tracks.
- The shunting-yard algorithm rearranges the tokens in a similar manner to transform an infix expression into a postfix expression.

Algorithm Description

1. Create stack to hold operators (and parens)
2. For each token in the infix expression:
 - If token is an operand, add to output
 - If token is a left paren, push onto stack
 - If token is an operator:
 - a. While there is an operator on top of the stack and token has lesser or equal precedence than operator on stack:
Pop operator off stack and add to output.
 - b. Push token onto stack.
 - If token is a right paren:
 - a. While top of stack is not a left paren:
Pop operator off stack and add to output.
 - b. Pop left paren off stack and discard it.
3. While stack is not empty:
Pop operator off stack and add to output.

Example

Infix Expression: (1 * 2 + 3 * 4) * 5

Output

Input

(1 * 2 + 3 * 4) * 5

Example

Infix Expression: (1 * 2 + 3 * 4) * 5

Output

Input

1 * 2 + 3 * 4) * 5

(

Example

Infix Expression: (1 * 2 + 3 * 4) * 5

Output

1

Input

* 2 + 3 * 4) * 5

(

Example

Infix Expression: (1 * 2 + 3 * 4) * 5

Output

1

Input

2 + 3 * 4) * 5

*

(

Example

Infix Expression: (1 * 2 + 3 * 4) * 5

Output

1 2

Input

+ 3 * 4) * 5

*
(

Example

Infix Expression: (1 * 2 + 3 * 4) * 5

Output

1 2 *

Input

3 * 4) * 5

+
(

Example

Infix Expression: (1 * 2 + 3 * 4) * 5

Output

1 2 * 3

Input

* 4) * 5

+
(

Example

Infix Expression: (1 * 2 + 3 * 4) * 5

Output

1 2 * 3

Input

4) * 5

*

+

(

Example

Infix Expression: (1 * 2 + 3 * 4) * 5

Output

1 2 * 3 4

Input

) * 5

*

+

(

Example

Infix Expression: (1 * 2 + 3 * 4) * 5

Output

1 2 * 3 4 *

Input

* 5

+
(

Example

Infix Expression: (1 * 2 + 3 * 4) * 5

Output

1 2 * 3 4 * +

Input

* 5

(

Example

Infix Expression: (1 * 2 + 3 * 4) * 5

Output

1 2 * 3 4 * +

Input

* 5

Example

Infix Expression: (1 * 2 + 3 * 4) * 5

Output

1 2 * 3 4 * +

Input

5

*

Example

Infix Expression: (1 * 2 + 3 * 4) * 5

Output

1 2 * 3 4 * + 5

Input

*

Example

Infix Expression: (1 * 2 + 3 * 4) * 5

Output

1 2 * 3 4 * + 5 *

Input