# Infix to Prefix Conversion

A + B * C

= A + (B * C) (Scan 1)

= A + * B C (Scan 2)

= + A * B C (Scan 3)

| Input Exp | Stack | Prefix |
|---|---|---|

Reverse the infix Exp

→ C * B + A

| | | |
|---|---|---|
| C | | C |
| * | * | C |
| B | * | C B |
| + | + | C B * |
| A | + | C B * A |

+ A * B C ← Reverse C B * A +

Eg: K+L−M*N+(O^P)*W/U/V*T+Q

Reverse: Q+T*V/U/W*)P^O(+N*M−L+K

→

| InputExp | Stack | Prefix | |
|---|---|---|---|
| Q | | Q | |
| + | + | Q | |
| T | + | QT | |
| * | +* | QT | |
| V | +* | QTV | |
| / | +*/ | QTV | ( L-R Asso, just push) |
| U | +*/ | QTVU | |
| / | +*// | QTVU | |
| W | +*// | QTVUW | |
| * | +*//* | QTVUW | |
| ) | +*//*) | QTVUW | |
| P | +*//*) | QTVUWP | |
| ^ | +*//*)^ | QTVUWP | |
| O | +*//*)^ | QTVUWPO | |
| ( | +*//* | QTVUWPO^ | |
| + | ++ | QTVUWPO^*//* | |
| N | ++ | QTVUWPO^*//*N | |
| * | ++* | QTVUWPO^*//*N | |
| M | ++* | QTVUWPO^*//*NM | |

Reverse: Q+T*V/U|W*)P^O(+N*M-L+K

| | | |
|---|---|---|
| M | ++* | QTVUWPO^*//*NM |
| - | ++- | QTVUWPO^*//*NM* |
| L | ++- | QTVUWPO^*//*NM*L |
| + | ++-+ | QTVUWPO^*//*NM*L |
| K | ++-+ | QTVUWPO^*//*NM*LK |

QTVUWPO^*//*NM*LK+-++

↓ Reverse

++-+KL*MN*//*^OPWUVTQ

# Without Stack

K+L− M*N + (O^P)* W/U/V * T +Q

= K+L−M*N + ^OP * W/U/V *T + Q

= K+L− *MN + ^OP *W/U/V *T+Q

= K+L− *MN + *^OPW/U/V*T+Q

= K+L−*MN + /*^OPWU/V*T+Q

= K+L−*MN + //*^OPWUV *T+Q

= K+L−*MN + *//*^OPWUVT+Q

= +KL−*MN + *//*^OPWUVT+Q

= −+KL*MN+*//*^OPWUVT+Q

= +−+KL*MN*//*^OPWUVT+Q

⇒ ++−+KL*MN*//*^OPWUVTQ

# Things to Remember

* Infix → Prefix

→ Operators of same precendence, then check Asso.,

if L-R simply push in stack

if R-L pop & check with the top of the stack

→ Reverse → get Exp. → Reverse

* Infix → Postfix

→ Operators of same precendence, then check Asso.

if L-R pop & check with top of the stack

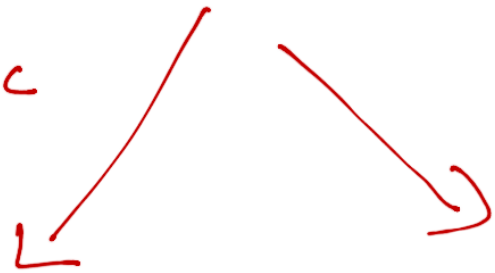
if R-L Simply push in Stack

- Prefix/Postfix — Do NOT need precendence & asso., hence becomes highly efficient for parsing.

Eg: $a - b + c$ , $a = 3, b = 4, c = 5$

$(a-b)+c$ $\quad$ $a-(b+c)$

$= 4$ $\quad$ $= -6$



4 $\quad$ $-6$

which is correct ??

Prefix : $(a-b)+c$ $\quad$ | $\quad$ $a-(b+c)$

$= -ab+c$ $\quad$ | $\quad$ $= a-+bc$

$= +-abc$ $\quad$ | $\quad$ $= -a+bc$

$= 4$ $\quad$ $= -6$

Postfix : $(a-b)+c$ $\quad$ | $\quad$ $a-(b+c)$

$= ab-+c$ $\quad$ | $\quad$ $= a-bc+$

$= ab-c+$ $\quad$ | $\quad$ $= abc+-$

$= 4$ $\quad$ $= -6$