# Infix, Prefix and Postfix Expressions

# Algebraic Expression

- An algebraic expression is a legal combination of
- operands and the operators.
- Operand is the quantity (unit of data) on which a mathematical operation is performed.
- Operand may be a variable like x, y, z or a
- constant like 5, 4,0,9,1 etc.
- Operator is a symbol which signifies a mathematical or logical operation between the operands.
- Example of familiar operators include
  ^ ,/ ,*,-,+
- An example of expression as x+y*z.

# Infix, Prefix and Postfix Expressions

- INFIX: the expressions in which operands surround the operator,
- e.g. x+y, 6*3 etc this way of writing the Expressions is called infix notation.

- POSTFIX: Postfix notation are also Known as Reverse Polish Notation (RPN). They are different from the infix and prefix notations in the sense that in the postfix notation, operator comes after the operands,
- e.g. xy+, xyz+* etc.

- PREFIX: Prefix notation also Known as Polish notation. In the prefix notation, operator comes before the operands,
- e.g. +xy, *+xyz etc.

# Operator Priorities

- How do you figure out the operands of an
- operator?

a + b * c
a * b + c / d

- This is done by assigning operator priorities.

priority(*) = priority(/) > priority(+) = priority (-)

- When an operand lies between two operators, the operand associates with the operator that has higher priority.

- When an operand lies between two operators that have the same priority, the operand associates with the operator on the left.

a + b - c
a * b / c / d

# Prefix to Postfix Conversion

- Prefix : An expression is called the prefix expression if the operator appears in the expression before the operands. Simply of the form (operator operand1 operand2).
- Example : Prefix : *+AB-CD Infix : (A+B) * (C-D)

- Postfix: An expression is called the postfix expression if the operator appears in the expression after the operands. Simply of the form (operand1 operand2 operator).
- Example : Postfix: AB+CD-* Infix : (A+B * (C-D)

- Given a Prefix expression, convert it into a Postfix expression.
- Conversion of Prefix expression directly to Postfix without going through the process of converting them first to Infix and then to Postfix is much better in terms of computation and better understanding the expression (Computers evaluate using Postfix expression).

# Examples of infix to prefix and post fix

Examples of infix to prefix and post fix

| Infix | Postfix | Prefix |
|---|---|---|
| A+B | AB+ | +AB |
| (A+B) * (C + D) | AB+CD+* | *+AB+CD |
| A-B/(C*D^E) | ABCDE^*/- | -A/B*C^DE |

# Postfix Examples

## Postfix Examples

| Infix | Postfix | Evaluation |
|---|---|---|
| 2 - 3 * 4 + 5 | 2 3 4 * - 5 + | -5 |
| (2 - 3) * (4 + 5) | 2 3 - 4 5 + * | -9 |
| 2- (3 * 4 +5) | 2 3 4 * 5 + - | -15 |