

*A boolean expression is an expression that evaluates to either true or false.*

It typically involves logical and/or relational operators and is used to make decisions or control the flow of a program.

Boolean expressions are commonly encountered in programming languages and are used in conditions, loops, and conditional statements.

Some key components of boolean expressions:

## 1. Relational Operators:

Relational operators compare two values and evaluate to either true or false. Common relational operators include:

- Equality (==): Checks if two values are equal.
- Inequality (!=): Checks if two values are not equal.
- Greater than (>): Checks if the left operand is greater than the right operand.
- Less than (<): Checks if the left operand is less than the right operand. Greater than or equal to (>=): Checks if the left operand is greater than or equal to the right operand.
- Less than or equal to (<=): Checks if the left operand is less than or equal to the right operand.

## 2. Logical Operators:

Logical operators combine boolean expressions and produce a boolean result. Common logical operators include:

- Logical AND (&&): Evaluates to true if both operands are true.
- Logical OR (||): Evaluates to true if at least one of the operands is true.
- Logical NOT (!): Negates the boolean value of the operand.

## 3. Boolean Variables:

Boolean variables are variables that can hold boolean values (true or false). They are often used to store the result of boolean expressions or to control program flow.

## 4. Boolean Constants:

Boolean constants directly represent boolean values. In many programming languages, the constants true and false are used to represent the boolean values.

## Examples of boolean expressions:

- $x > 5$ : Evaluates to true if the value of x is greater than 5.
- $y \neq 0 \ \&\& \ x > 10$ : Evaluates to true if y is not equal to 0 and x is greater than 10.
- $a == \text{true} \ || \ b == \text{false}$ : Evaluates to true if either a is true or b is false.
- $!(x \leq 3)$ : Evaluates to true if x is not less than or equal to 3.