

# User Manual

Truthy™

## Introduction:

Truthy is a Boolean logic simulator that allows users to input Boolean expressions. A Boolean expression is a mathematical expression that only operates on binary values known as Booleans, where 0 = false, 1 = true. The program will evaluate the expression for the user and optionally show the truth table.

## Installation:

You can download the latest version at: <https://github.com/KU-EECS-348-group-R6/Truthy/releases/tag/V1.0>

## Getting Started:

Launch the application found at above link. From there a command line will appear and allow you to type in your Boolean expression.

**Valid Operators:** Truthy™ only supports True and False values that are to be represented by T and F respectively. Giving any other input will result in error.

Operand	Truthy™ Equivalent
0	F
1	T
true	T
false	F

## Valid Operands:

Logical Operator	Truthy™ equivalent
NOT	!
AND	&

OR	
NAND	@
XOR	\$

**Parenthesis:** Boolean expressions have order of operations. Truthy™ Allows for users to use parenthesis to manage order of operations.

## Additional Features (Beta):

**Exit:** typing exit into the terminal will close the application

**Help:** typing help into the terminal will show a list of operators and examples

**Truth Table(Beta):** typing 'table' before your Boolean expression will print a truth table.

Note: Since variables are not implemented as of 4/25/2024, when you input F/T. You can think of T as var A, and F as var B. This means that 2 variable truth tables are the only kind implemented as of now.

## Glossary:

NOT: does the logical inverse

AND: only evaluates true when both statements are true. I.E. When A is true **and** B is true

OR: evaluate true when either statements are true. I.E. When A is true **or** B is true.

NAND: this is the inverse of AND

XOR: This stands for exclusive OR. It will be true if either statement is true, but not when both are true.

Github: A site that hosts online repositories. I.E. it stores a bunch of code.

## Examples:

```

Welcome to the Boolean Logic Simulator. Type 'exit' to quit or 'help' for instructions.
Type 'table' followed by an expression to generate a truth table.
Please enter your command: T | F
Result: True
Please enter your command: TABLE T | F
T      F      Result
-----
F      F      False
T      F      True
F      T      True
T      T      True
Final Result of the expression: True
Please enter your command: HELP
Enter Boolean expressions using variables (T, F) and operators (&, |, !, @, $).
For example: T & F, !T, (T | F) & F.
To generate a truth table: table (T & F) | (T & F)
Please enter your command: (T & F) | (T & F)
Result: False
Please enter your command: TABLE (T & F) | (T & F)
T      F      Result
-----
F      F      False
T      F      False
F      T      True
T      T      True
Final Result of the expression: False
Please enter your command:

```

## FAQ:

**What is truthy?** Truthy is a Boolean logic simulator **What is a Boolean logic simulator?**

A Boolean logic simulator is a simulator that allows inputs of Booleans, Boolean operators, and parenthesis, that outputs one final Boolean value (True or False).

**What happens after my expression is inputted?** Truthy parses your input, tokenizes it, then evaluates it.

**What is a Boolean?** A Boolean is a value that is either true or false.

**What Boolean operators does Truthy support?** Truthy supports and, or, not, nand, and xor, the last two being the opposite of and, and exclusive or, respectively (&, |, !, @, \$).

**What happens if nothing is inputted?** An error is thrown.

**Why is a syntax error being thrown when I try to use the not operator (!)?** This is probably because you are trying to put it in between two Boolean values, and not just in front of one. For example T!T is invalid be !T becomes F making the expression TF, which doesn't evaluate to one single value without another operator.

**Is there a max size expression?** Truthy allows for accurate expressions under 500 characters long, anything longer works in theory but the runtime will increase as the characters are increased.

**What types of errors does truthy check for?** Invalid Expressions, which includes Missing operand, Unknown operator, Mismatched parentheses, Circular logic, Empty expression, Double operator, Missing truth values, Inconsistent characters, Operator after operand, Invalid characters.

**How does truthy work?** Truthy works by implementing c++ code that runs when the .exe file is opened/started.

## Troubleshooting:

Error	Cause	Example Input	Solution
Missing operator	Two expressions next to each other without an operator	TT	Introduce an operator between the expressions
Tokenization error	A character that is not an operator or a-z	^ * # ~	Use a letter between a and z for variables

<b>Missing closing parenthesis</b>	Parenthesis were opened, but not closed	(T	Add a matching closing parenthesis before the end of the expression
<b>Missing operand</b>	Two operators next to each other without an operator		Introduce an expression between the operators
<b>Missing opening parenthesis</b>	Parenthesis were closed before they were opened	T)	Open the parentheses, or remove the extra closing parenthesis

