

# Verifying the Given Expression using Boolean Laws

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IITH - Future Wireless Communication-(FWC22029)

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Component	Value	Quantity
Resistor	220 Ohm	1
Arduino	UNO	1
Seven Segment Display		1
Decoder	7447	1
Jumper Wires	M-M	20
Breadboard		1

Figure 1: list of components

## 1 ABSTRACT

The objective of this manual is to show how to Verify the Boolean Expression  $U' + V = U'V' + U'V + UV$

## 2 INTRODUCTION

Boolean algebra problems can be solved using these Boolean algebra laws. There are few boolean algebra rules to be followed while solving problems. In order to define the functioning of a digital logic circuit, Boolean Algebra makes use of a set of Laws and Rules. Along with being used to represent digital input and output, the logic symbols "0" and "1" may also be used as constants to indicate a circuit or contact that is either permanently "Open" or "Closed."

## 3 MATHEMATICAL PROOF

To prove:  $U' + V = U'V' + U'V + UV$

$$\begin{aligned}
 RHS &= UV + UV + UV \\
 &= U'(V+V') + U.V \text{ (using distributive law)} \\
 &= U'(1) + U.V \text{ (using complement law)} \\
 &= U' + U.V \text{ (using identity law)} \\
 &= (U' + U).(U' + V) \text{ (using distributive law)} \\
 &= 1.(U' + V) \text{ (using complement law)} \\
 &= U' + V \text{ (using identity law)} \\
 RHS &= LHS
 \end{aligned}$$

## 4 COMPONENTS

## 5 HARDWARE

Problem 5.1. Make connections between the seven segment display and the 7447 IC

Problem 5.2. Make connections to the lower pins of the 7447 and connect  $VCC = 5V$ . You should see the number 0 displayed for 0000 and 1 for 0001.

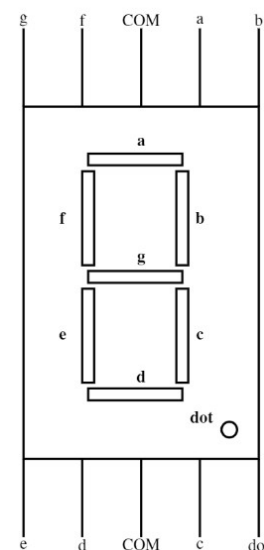


Figure 2: seven segment

D	C	B	A	Decimal
0	0	0	0	0
0	0	0	1	1

Figure 3:

Problem 4.3. Complete Table 2.2 by generating all numbers between 0-9

## 6 SOFTWARE

1. Connect the Arduino to the computer.
2. Download the following directory  
subsectionCode Link

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1 \\GITHUB : [https://github.com/19PA1AO410/FWC-Module-1/blob/main/Aluru\\_Ajay-Assignment\\_1/Code.cpp](https://github.com/19PA1AO410/FWC-Module-1/blob/main/Aluru_Ajay-Assignment_1/Code.cpp)

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## 7 CONCLUSION

Lets consider the the both(LHS and RHS) equations as A and B

CASE 1: If  $A=B$ , then seven segment shows "1"

CASE 2: If  $A \neq B$ , then seven segment shows "0"