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Distributive law proof using Arduino

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1 Introduction

There are different type of boolean algebra rules to simplify the boolean expression.One of the important law is distributive law.This can be stated as follows: A.(B+C)=A.B+A.C (OR distributive law). A+(B.C)=(A+B).(A+C) (AND distributive law).

2 Method to solve

To prove distributive law I used seven segment display and 7447 Ic to control it using binary.Take 3 variables a,b,c and take another 2 variables x,y for LHS (A.(B + C)) and RHS (A.B + A.C).

If they are equal the seven segment display display's 1 else display's 0. By changing three boolean variables we can observe the distributive law satisfies or not for different inputs.Like these we can prove the distributive law.

code link :

https://github.com/Sravan24365/iith−fwc/blob/main/assign1%20ide/codes/src/main.cpp

3 Components

Component	value	quantity
Resistor	220 ohm	1
Arduino	UNO	1
sevensegment display		1
decoder	7447	1
Bread board		1
Jumper wires	M-M	20

Table 1:

4 Distributive law proof with truth table

.

A	B	C	x(LHS)	y(RHS)
0	0	0	0	0
0	0	1	0	0
0	1	0	0	0
0	1	1	0	0
1	0	0	0	0
1	0	1	1	1
1	1	0	1	1
1	1	1	1	1

Table 2:

5 Connections

Make connections to the Sevensegment display and 7447 IC based on table 3 and figure 1.

7447	a'	b'	c'	d'	e'	f'	g'
Display	a	b	c	d	e	f	g

Table 3:

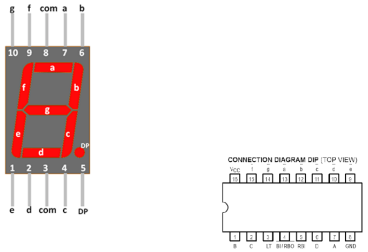

Figure 1:Sevensegment and 7447 IC.

Also make connections to arduino UNO ,7447 IC and inputs based on below table

Arduino UNO	2	3	4	5	6	7	8
7447	A	B	C	D			
input					k	l	m

6 Conclusion

The output of sevenseg is 1 for all possible inputs.So x=y i.e A.(B+C)=A.B+A.C hence distributive law verfied.