Assignment 1

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Download the codes from

https://github.com/pavanmanesh/EE5803/tree/main/assign1

1 Problem

Verify the following using Boolean Laws.

$$A^{'} + B^{'}.C = A^{'}.B^{'}.C^{'} + A^{'}.B.C^{'} + A^{'}.B.C + A^{'}.B^{'}.C + A.B^{'}.C$$

2 Boolean Laws Used

- Complement Law:

$$X + X^{'} = 1 \tag{2.0.1}$$

- Distributive Law:

$$X + Y.Z = (X + Y).(X + Z) \tag{2.0.2}$$

3 Solution

Consider the right hand side of the given problem:

$$\begin{aligned}
\text{RHS} &= A^{'}.B^{'}.C^{'} + A^{'}.B.C^{'} + A^{'}.B.C + A^{'}.B^{'}.C + A.B^{'}.C && (3.0.1)\\
&= A^{'}.B^{'}.C^{'} + A^{'}.B(C^{'} + C) + A^{'}.B^{'}.C + A.B^{'}.C && (3.0.2)\\
&= A^{'}.B^{'}.C^{'} + A^{'}.B + A^{'}.B^{'}.C + A.B^{'}.C \ \{\text{Using (2.0.1)}\} && (3.0.3)\\
&= A^{'}.B + A^{'}.B^{'}(C^{'} + C) + A.B^{'}.C && (3.0.4)\\
&= A^{'}.B + A^{'}.B^{'} + A.B^{'}.C \ \{\text{Using (2.0.1)}\} && (3.0.5)\\
&= A^{'}(B + B^{'}) + A.B^{'}.C && (3.0.6)\\
&= A^{'} + A.B^{'}.C \ \{\text{Using (2.0.1)}\} && (3.0.7)\\
&= (A^{'} + A)(A^{'} + B^{'}.C) \ \{\text{Using (2.0.2)}\} && (3.0.8)\\
&= A^{'} + B^{'}.C \ \{\text{Using (2.0.1)}\} && (3.0.9)\\
&= \text{LHS}
\end{aligned}$$

4 Truth Table

A	B	C	LHS	RHS
0	0	0	1	1
0	0	1	1	1
0	1	0	1	1
0	1	1	1	1
1	0	0	0	0
1	0	1	1	1
1	1	0	0	0
1	1	1	0	0

TABLE 0: Truth Table