1) TRUTH TABLE (ALP TUNA - 2019400288)

X2	X1	X0	Y
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	0

2) SOP Minimization

Y = X2'X1X0' + X2X1'X0' + X2X1'X0

= X2'X1X0' + X2(X1'X0' + X1'X0) [Distributivity]

= X2'X1X0' + X2(X1'(X0'+ X0)) [Distributivity]

= X2'X1X0' + X2(X1'(1)) [Complement]

= X2'X1X0' + X2X1' [Identity]

3) POS Minimization

Y = (X0+X1+X2)(X0'+X1+X2)(X0'+X1'+X2)(X0+X1'+X2')(X0'+X1'+X2')

= (X1+X2+ X0X0')(X0'+X1'+X2)(X0+X1'+X2')(X0'+X1'+X2') [Distributivity]

= (X1+X2+ 0)(X0'+X1'+X2)(X0+X1'+X2')(X0'+X1'+X2') [Complement]

= (X1+X2)(X0'+X1'+X2)(X0+X1'+X2')(X0'+X1'+X2') [Identity]

= (X1+X2)(X0'+X1'+X2)(X1'+X2' + X0X0') [Distributivity]

= (X1+X2)(X0'+X1'+X2)(X1'+X2' + 0) [Complement]

= (X1+X2)(X0'+X1'+X2)(X1'+X2') [Identity]

= (X1' +X2')(X1+X2)(X0'+X1'+X2) [Commutativity]

= (X1'+X2')(X2 + X1(X0'+X1')) [Distributivity]

= (X1'+X2')(X2 + X1X0' + X1X1') [Distributivity]

= (X1'+X2')(X2 + X1X0' + 0) [Complement]

= (X1' +X2')(X2+ X1X0') [Identity]

= (X1'+X2')(X2+X1)(X2+X0') [Distributivity]

4) Circuit

Y = X2’X1X0’ + X2X1’ (Minimized SOP)

Y = (X0 + X2)’X1 + X2X1’ (De Morgan’s Law, I implemented this equation to minimize the number of gates.