Homework 1

CSE 232

March 2021

1. (30 points) Simplify the following function by using boolean algebra F(x, y, z) = xy + x’ z + yz.

F(x, y, z) = xy + x’ z + yz

= xy + x’ z + yz . (x+x’)

= xy + x’z + xyz + x’yz

= xy + xyz + x’z + x’yz

= xy (1+z) + x’z (1+y)

= xy . 1 + x’z . 1

= xy + x’z

2. (30 points) Derive that (x + y)(x ‘ + z)(y + z) = (x + y)(x ‘ + z) by using boolean algebra.

(x + y)(x ‘ + z)(y + z)

= (x’+z) (y+z) x + (x’+z) (y+z) y

= (y+z)xx’ + (y+z) xz + (x’+z)(y+z)y

= 0 + (y+z) xz + (x’+z)(y+z)y

= (y+z) xz + (x’+z)(y+z)y

= xzy + xzz + (x’+z)(y+z)y

= xzy + xz + (x’+z)(y+z)y

= xz + (x’+z)(y+z)y

= xz + (y+z)yx’ + (y+z)yz

= xz + yx’y + yx’z+ (y+z)yz

= xz + yx’+ yx’z + (y+z)yz

= xz + yx’ + (y+z)yz

= xz + yx’ + yzy + yzz

= xz + yx’ + yz + yzz

= xz + yx’ + yz + yz

= xz + yx’ + yz

= xz + yx’

= (x+y)(x’+z)

3. (a) (30 points) Express the following function in sum of minterms and product of maxterms by using truth table F(A, B, C, D) = B’D + A’D + BD.

(b) (10 points) Simplify the standard expression F(A, B, C, D) = B’D + A’D + BD.

a-)

SUM OF MINTERMS

F(A, B, C, D) = B’D + A’D + BD

= (A+A’)B’(C+C’)D + A’(B+B’)(C+C’)D + (A+A’)B(C+C’)D

= AB’CD + AB’C’D + A’B’CD + A’B’C’D + A’BCD + ABCD + ABC’D + A’BC’D

= ∑ (1,3,5,7,9,11,13,15)

TRUTH TABLE

A	B	C	D	**F**
1	1	1	1	**1**
0	1	1	1	**1**
1	0	1	1	**1**
0	0	1	1	**1**
1	1	0	1	**1**
0	1	0	1	**1**
1	0	0	1	**1**
0	0	0	1	**1**
1	1	1	0	**0**
0	1	1	0	**0**
1	0	1	0	**0**
0	0	1	0	**0**
1	1	0	0	**0**
0	1	0	0	**0**
1	0	0	0	**0**
0	0	0	0	**0**

b-)

B’D+A’D+BD

= D(B’+B)+A’D

= D.1+A’D

= D +A’D

= D