BLM/COM275

2021-2022 Fall

Homework-3

Due Date: 6.12.2021 11:59 p.m.

Answer on paper and upload the photo of the solutions to the system in pdf format. The name of the file you uploaded to the system should be "**StudentNumber.pdf**". Also, bring your answer paper with you at your lab time and hand it in.

Q1. Simplify the following Boolean functions, using Karnaugh maps:

a) $F(w,x,y,z) = \sum(1,4,5,6,7,13)$

b) $F(w,x,y,r) = \sum(0,1,5,8,9)$

Q2. Find the minterms of the following Boolean expressions by first plotting each function in a map:

a) $wyz + w'x' + wxz'$

b) $A'B + A'CD + B'CD + BC'D'$

Q3. Simplify the following Boolean functions to product-of-sums form:

a) $F(w,x,y,z) = \sum(0,1,2,5,8,10,13)$

b) $F(A,B,C,D) = \prod(1,3,6,9,11,12,14)$

Q4. Simplify the following functions, and implement them with two-level NAND gate circuits:

a) $F(A,B,C,D) = A'B'C + AC' + ACD + ACD' + A'B'D'$

b) $F(A,B,C) = (A' + B' + C')(A' + B')(A' + C')$

Q5. Draw a logic diagram using only two-input NOR gates to implement the following function:

$F(A,B,C,D) = (A \oplus B)'(C \oplus D)$

Q6. Implement the following Boolean function F, together with the don't-care conditions d, using no more than two NOR gates :

$F(A,B,C,D) = \sum(2,4,6,10,12)$

$d(A,B,C,D) = \sum(0,8,9,13)$

Q7. Implement the following Boolean function F, using the two-level forms of logic (a) NAND-AND, (b) AND-OR, (c) OR-NAND, (d) NOR-OR:

$F(A,B,C,D) = \sum(0,4,8,9,10,11,12,14)$

Q8. Implement the following Boolean expressions with three half adders:

a) $D = A \oplus B \oplus C$

b) $F = ABC' + (A' + B')C$