UNIVERSITY OF TEHRAN

Electrical and Computer Engineering Department

Digital Logic Design, ECE 367 / Digital Systems I, ECE 894

Spring 1399-1400

Homework 3

Boolean Algebra and Karnaugh-Map Basics

Name:	**Date:**
Username:	

1. A) Using Boolean algebra rules minimize the following functions. B) Show NAND realization of the minimized functions.

   $f(a,b,c,d) = a'.b'.c.d' + a'.b.c' + b.c.d + a'.c.d' + b'.c.d' + a.b'.c$

   $f(a,b,c,d) = a'.b'.c' + a'.b'.c + a.b' + b'.c'.d + b'.c.d'$

2. Minimize function $f(a,b,c,d)$ using Boolean algebra.

   $f(a,b,c,d) = a'.b.c.d + a.b.c.d + a'.b.c.d' + a.b.c.d'$

3. Given the above function, after minimization how many forms this function can be written using AND terms with four variables, AND terms with three variables, and AND terms with 2 variables?

4. Minimize function $f(a,b,c)$ using Karnaugh Maps.

   $f(a,b,c) = a'.b.c + a.b.c + b'.c'$

5. Write list of minterms of the following function:

   $f(a,b,c) = a'.b + a.c + b'.c'$

6. Write all alternative minimal realizations of the function shown below:

   $f(a,b,c) = \sum_m (2, 3, 4, 5, 7)$