



Istanbul Technical University  
Department of Computer Engineering

11.10.2019

## BLG 231E - Digital Circuits

### Take-Home Exam-2

**Due Date:** 17.10.2019, **Thursday**, 16:00.

- Please write neatly.
- Please prepare your homework in a computer.
- **Consequences of plagiarism:** Any cheating will be subject to the University disciplinary proceedings.
- **No late submissions** will be accepted.

**Submissions:** Please submit your solutions to the **Digital Circuits Course** Assignment Box in the front of the **department secretary's office** in the beginning of the corridor 33xx.

1. The truth table for a function  $f(a, b, c, d)$  is given as follows.

$a$	$b$	$c$	$d$	$f$
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	1
0	1	0	1	0
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	1
1	1	1	1	0

- Write the expressions of  $f$  in the first and second canonical forms.
- Minimize the expression in the first canonical form using axioms and theorems of the Boolean algebra.
- Draw the circuit for the minimized expression in **b** by using only 2-input NAND gates.