Istanbul Technical University
Department of Computer Engineering

BLG 231E - Digital Circuits
Assignment 4

Due Date: 14.11.2013, **Thursday,** 17.00.

- Please **write <u>neatly</u>**.
- If you are not preparing your homework in a computer, please show complement of a symbol by putting a **dash** over the symbol (e.g. do not use ~~x'~~ use $\bar{x}$).
- Plagiarized assignments will be given a negative mark.
- **No late submissions** will be accepted.

Submissions: Please submit your solutions to the Digital Circuits Course Assignment Box at the department secretary's office.

1. A combinational logic circuit has three 4-bit inputs (A, B and C) and three 1-bit outputs (f1, f2 and f3). Unsigned integers are applied to the inputs. Outputs should be set to 1 only in the following conditions.

- **f1:** The number applied to A is greater than the numbers at other inputs
- **f2:** The number applied to A is the median of three numbers at the inputs.
- **f3:** The number applied to A is smaller than the numbers at other inputs

Design this circuit using only two 4-bit parallel full adders, one decoder with appropriate size and necessary logic gates.

2. Definition of a function with four inputs (a, b, c and d) is given below.

$$f(a, b, c, d) = \bigcup_1 (2, 3, 5, 6, 8, 10, 11, 15)$$

Implement this function using only necessary number of 4:1 multiplexers and a NOT gate.