

EHB 205E: Introduction to Logic Design

Quiz 1

Duration: 60 Minutes

Grading: 1) 10%, 2) 30%, 3) 30%, 4) 30%

Quiz is in closed-notes and closed-books format

For your answers please use the space provided in the exam sheet

GOOD LUCK!

1. CONVERSION BETWEEN NUMBER REPRESENTATIONS

Perform the following number conversions:

- a) Binary $(1001.1001)_2$ to decimal.
- b) Octal $(72.6)_8$ to binary.

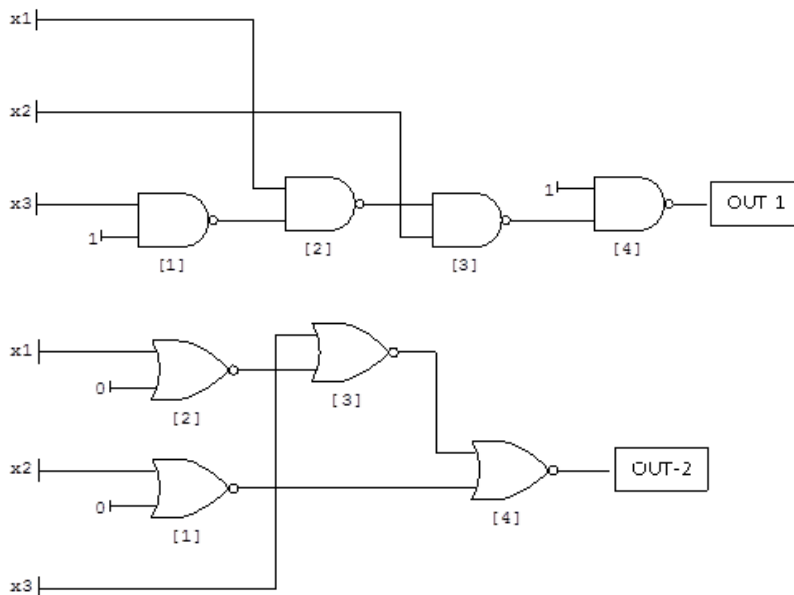
2. SIMPLIFIED SUM OF PRODUCT (SOP) EXPRESSIONS

Express the following Boolean functions in SOP forms with using minimum number literals. Write down the total **number of literals** for your simplified expressions (for example, $x_1\bar{x}_2x_3 + x_1\bar{x}_3$ has 5 literals).

- a) $f_1 = \overline{\bar{x}_1x_2x_3 + x_1x_4}$
- b) $f_2 = \overline{x_1x_2\bar{x}_3 + x_1\bar{x}_2x_3 + \bar{x}_1x_2x_3 + \bar{x}_1\bar{x}_2\bar{x}_3}$

3. CIRCUIT ANALYSIS

Consider the below two circuits having three inputs $x_1, x_2,$ and x_3 as well as 0 and 1 inputs. The one consisting of NAND2 gates has an output OUT 1 and the other one having NOR2 gates has an output OUT 2.



- a) Derive Boolean expressions of OUT 1 and OUT 2 in terms $x_1, x_2,$ and $x_3,$ and their negations.
- b) Find XOR of OUT 1 and OUT 2

4. DESIGNING WITH NAND GATES

Implement the following three functions with NAND-2 gates.

a) $f_1 = \overline{x_1x_2 + x_2x_3 + x_3x_4}$

b) $f_2 = \overline{x_1\bar{x}_2x_3 + x_1\bar{x}_4 + x_2x_3\bar{x}_4}$