

Solutions

EHB205E Introduction to Logic Design Quiz 2

Duration: 30 Minutes

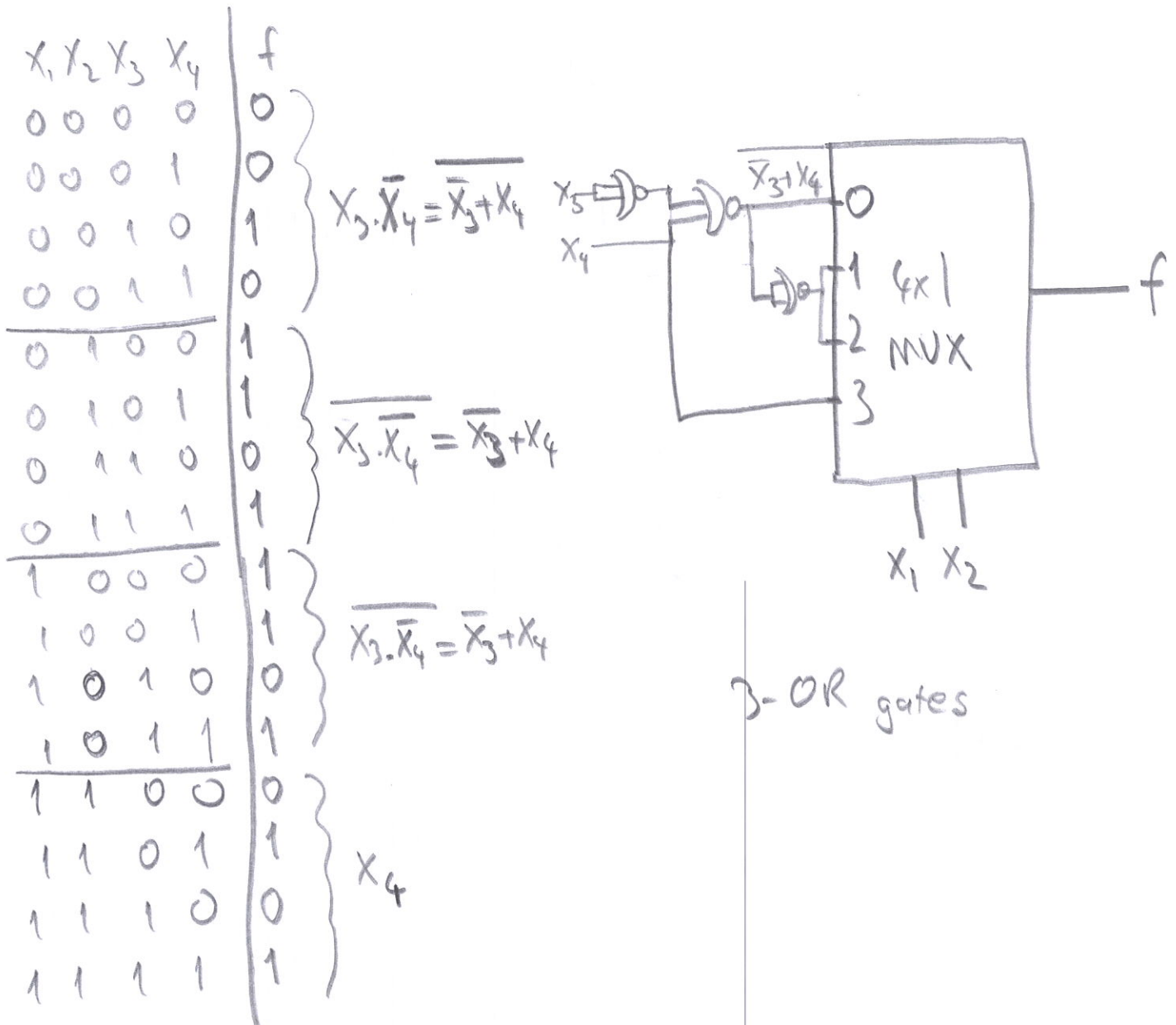
Grading: 1) 50%, 2) 50%

Quiz is in closed-notes and closed-books format

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

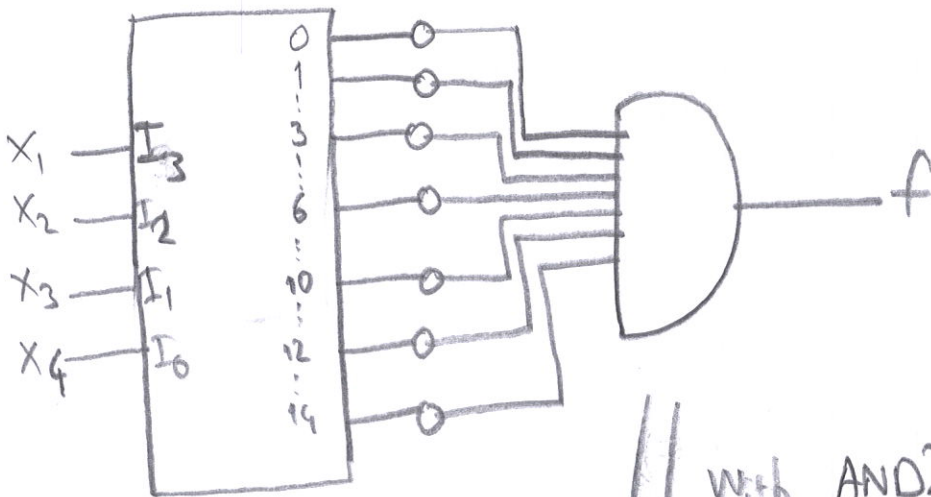
GOOD LUCK!

1. Implement a 4-variable Boolean function $f(x_1, x_2, x_3, x_4) = \sum(2, 4, 5, 7, 8, 9, 11, 13, 15)$ using a **single 4-to-1 multiplexer** and minimal number of **two-input NOR gates**. Use x_1 and x_2 as select input lines in the multiplexer. Use only variables x_1, x_2, x_3, x_4 as inputs (**not their negated forms**).

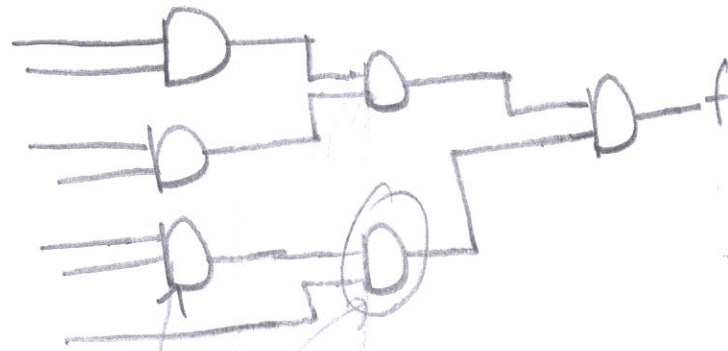


2. Implement a 4-variable Boolean function $f(x_1, x_2, x_3, x_4) = \sum (2,4,5,7,8,9,11,13,15)$ using a **single decoder** and minimal number of **two-input NAND gates**. Use only variables x_1, x_2, x_3, x_4 as inputs (**not their negated forms**).

$$\Sigma = (2,4,5,7,8,9,11,13,15) = \Pi (0,1,3,6,10,12,14)$$



with AND-2 gates



(6 AND gates)



1 AND-2 gate \equiv 2 NAND-2 gates

6 AND-2 gates \equiv 12 NAND-2 gates

12 NAND-2 gates + 7 NAND-2 gates = 19 gates
 (for AND-7) (for inverters)