Name: KEY Id#

COE 202, Term 131

Digital Logic Design

Quiz# 4

Date: Tuesday, Nov. 25

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**Q1**. Design a circuit that accepts two 2-bit unsigned numbers A = A1A0 and B = B1B0. The circuit produces A – B when A > B, and produces A + B otherwise. Find the following:

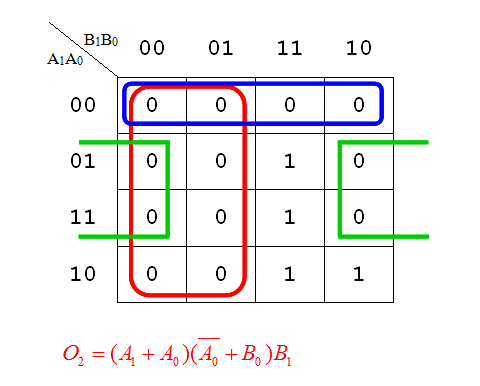
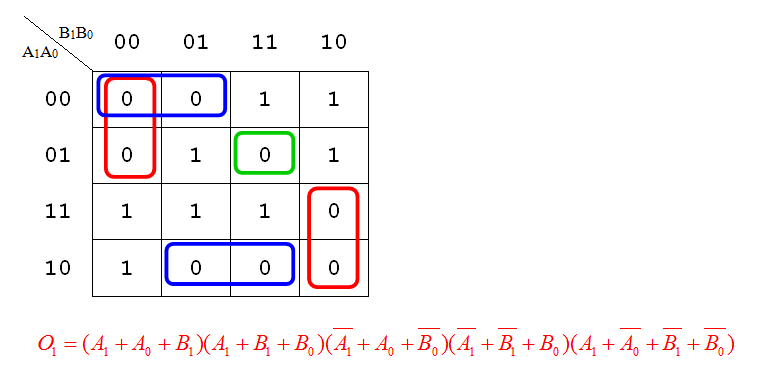
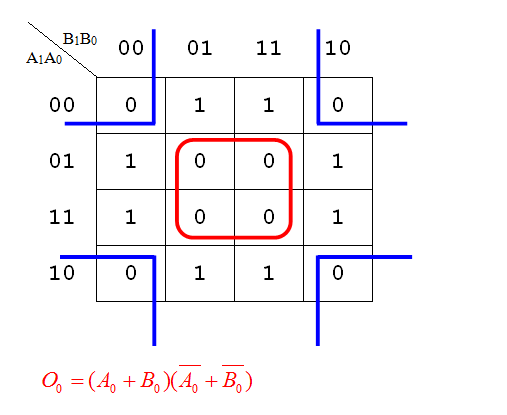
1. The number of outputs produced by the circuit.

*A* – *B* result is at most 2 bits, *A* + *B* result is at most 3 bits ⇒ **# outputs = 3**

1. The truth table of the circuit.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *A*1 | *A*0 | *B*1 | *B*0 | *O*2 | *O*1 | *O*0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| 1 | 0 | 1 | 1 | 1 | 0 | 1 |
| 1 | 1 | 0 | 0 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 0 |

1. The minimal product-of-sums expression for each output.

# **Q2**. Convert the AND/OR/NOT logic diagram shown below to a NAND logic diagram:

