CSC 137 Cokgor - Logic Gates Exercises (answers at the back)
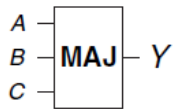
(Exercises reference: David M. Harris, Sarah L. Harris, Digital Design and Computer Architecture, 2nd Edition, Elsevier, 2013, ISBN-13: 978-0-12-394424-5)
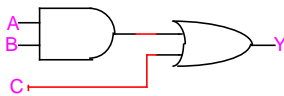
1)
  a. Draw the symbol, Boolean equation, and truth table for a three-input OR gate.

  b. Draw the symbol, Boolean equation, and truth table for a three-input exclusive-OR (XOR) gate.
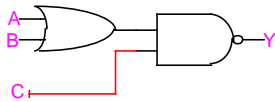
2) A *majority gate* produces a TRUE output if and only if more than half of its inputs are TRUE. Complete a truth table for the three-input majority gate shown below:

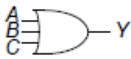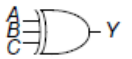3) Complete a truth table for the following circuit:

4) Complete a truth table for the following circuit:

Exercise Solutions:

1)

OR3

$Y = A+B+C$

A	B	C	Y
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

(a)

XOR3

$Y = A \oplus B \oplus C$

A	B	C	Y
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

(b)

2)

A	B	C	Y
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

3)

A	B	C	Y
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

4)

A	B	C	Y
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0