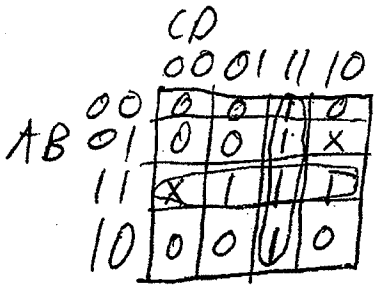
Oct. 15, 2010

EECE256 Quiz 2 – section 101

1. Simplify the following Boolean function with the associated don't care conditions using a Karnaugh map: (4 marks)

$F(A,B,C,D) = \sum(3,7,11,13,14,15);\ d = \sum(6, 12)$

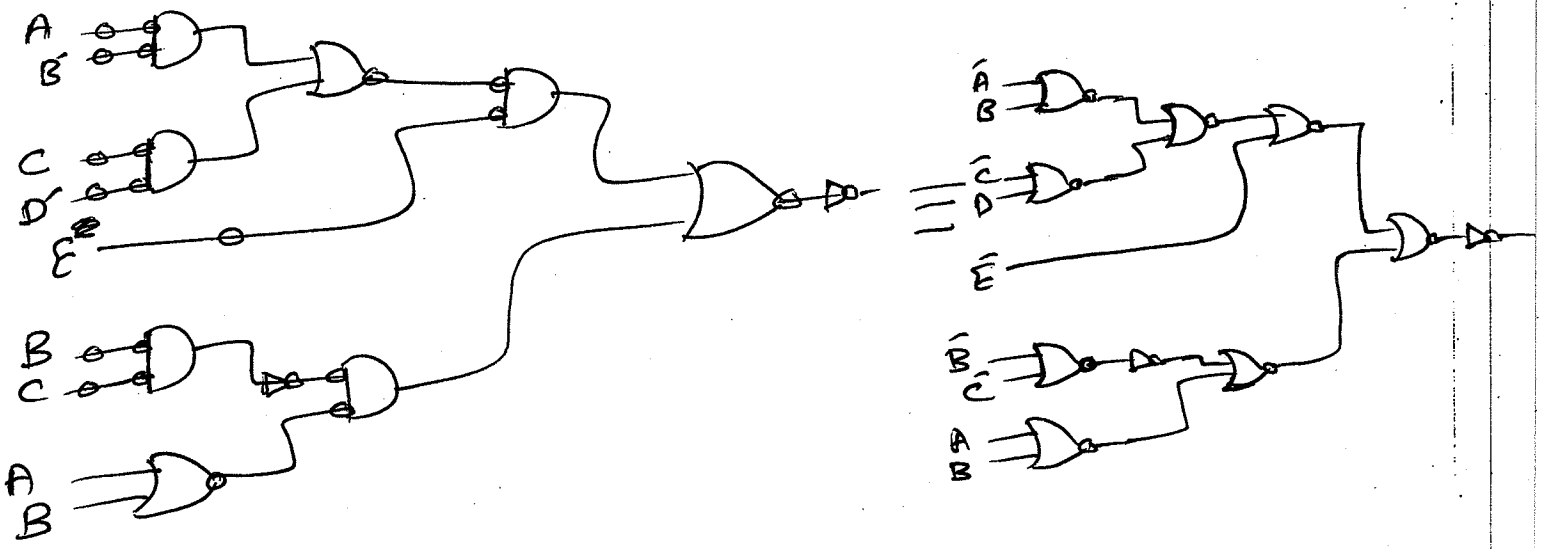
A	B	C	D	F
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	X
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	X
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1



$F = AB + CD$

2. Draw the multi-level **NOR** circuit for the following expression (4 marks):

$F(A,B,C,D,E) = (AB' + CD')E + BC(A+B)$

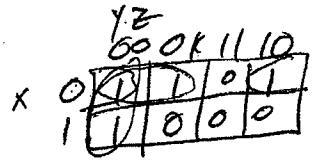


3. A **minority** circuit is one whose output is equal to 1 if the input variables have **less 1's than 0's**. Show the following:

a) the truth table for a 3 input version of this circuit (4 marks):

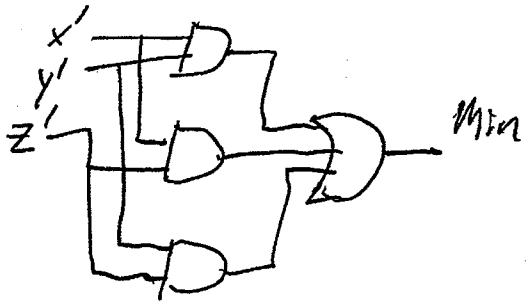
X	Y	Z	Min
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

b) A simplified Boolean equation of this circuit (2 marks)



$Min = y'z' + x'y' + x'z'$

c) A logic diagram of this circuit (2 marks)



4. A 3 input combinational circuit is defined by the following three Boolean functions:

F1 = (y' +x)z
F2 = y'z'+xy' + yz'
F3 = (x' + y)z

Design the circuit with a decoder and external gates. Show your design. (4 marks)

$F1 = y'z + xz = \overset{m_1}{x'y'z} + \overset{m_5}{xy'z} + \overset{m_5}{xy'z} + \overset{m_7}{xyz}$

$F2 = \overset{m_4}{xy'z'} + \overset{m_0}{x'y'z'} + \overset{m_5}{xy'z} + \overset{m_4}{xy'z'} + \overset{m_6}{xyz'} + \overset{m_2}{x'yz'}$

$F3 = x'z + yz = \overset{m_1}{x'y'z} + \overset{m_3}{x'yz} + \overset{m_3}{x'yz} + \overset{m_7}{xyz}$

x y z	F1	F2	F3
0 0 0	0	1	0
0 0 1	1	0	1
0 1 0	0	1	0
0 1 1	0	0	1
1 0 0	0	1	0
1 0 1	1	1	0
1 1 0	0	1	0
1 1 1	1	0	1