COE/EE 243 # Sample Exam **from Fall 98**

Questions taken from 2 exams, so it is a bit long

Do **NOT** use a calculator! You will probably need a piece of scratch paper.

1. (5 pts) The maxterm expansion for $F = xy + x'z$ is:
   (a) $xyz + xyz' + x'y'z + x'yz$
   (b) $(x+y+z)(x+y'+z)(x'+y+z)(x'+y+z')$
   (c) $(x+y)(x'+z)$
   (d) $(x'+y'+z')(x'+y+z)(x+y'+z')(x+y'+z)$
   (e) none of the above

2. (5 pts) Multiply $F(A,B,C,D,E) = (AB+C+D)(C'+D)(C'+D+E)$ out and simplify to obtain the sum of 2 products
   (a) $ABC'+D$
   (b) $ABDE+CD$
   (c) $AE+C'DE$
   (d) $ABE+C'$
   (e) none of the above

3. (5 pts) The complement of $F_1 = x(y'z'+yz)$ is:
   (a) $x+(y'+z')(y+z)$
   (b) $x'+(y+z)(y'+z')$
   (c) $x'(yz+y'z')$
   (d) $(x'+y+z)(x+y+z')$
   (e) none of the above

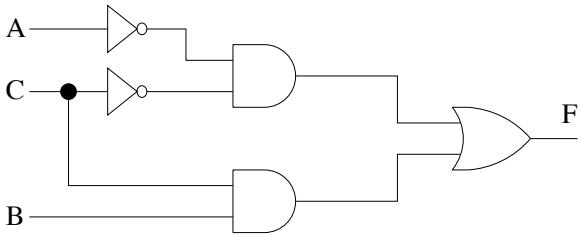
4. (4 pts) The minterm expansion for
   $F(A,B,C) = (A+B+C)(A+B'+C')(A'+B+C')(A'+B'+C)$ is:

   (a) $F(A,B,C) = \sum m(0,3,5,6)$
   (b) $F(A,B,C) = \prod M(1,2,4,7)$
   (c) $F(A,B,C) = \sum m(1,2,4,7)$
   (d) $F(A,B,C) = \prod M(0,3,5,6)$
   (e) none of the above

5. (4 pts) A circuit with three inputs, A,B, and C, is tested for all combinations of inputs. The output is "1" when exactly one of the inputs is "1". This circuit can be represented by the which of the following boolean expressions (assume positive logic):
   (a) $f(A,B,C) = ABC' + AB'C + A'BC$
   (b) $f(A,B,C) = (A' + B' + C)(A' + B + C')(A + B' + C')$
   (c) $f(A,B,C) = A'B'C + A'BC' + AB'C'$
   (d) $f(A,B,C) = A + B + C$
   (e) none of the above

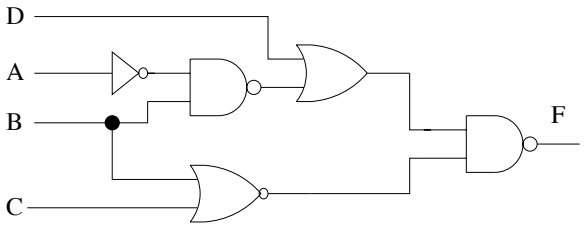
6. (5 pts) Simplify $F(A,B,C) = \prod M(1,4,5,6)$ to a product of 2 sums:
   (a) $(A + B + C')(A' + B + C)(A' + B + C')(A' + B' + C)$
   (b) $(A + B' + C')(A' + B' + C)$
   (c) $(B + C')(A' + C)$
   (d) $(A' + B + C')(A + C)$
   (e) none of the above

7. (5 pts) The minterm expansion for F(A,B,C) in the diagram below is:



   (a) $A'C' + BC$
   (b) $A'BC' + ABC$
   (c) $ABC + AB'C + AB'C' + A'B'C'$
   (d) $A'B'C' + A'BC' + A'BC + ABC$
   (e) none of the above

8. (5 pts) The minimum expression for the network shown below is:



(a) $(A'D+B)$
(b) $((D+(A'B)')(B+C)')'$
(c) $(AB'D)+B'+C'$
(d) $B+C$
(e) none of the above

9. (6 pts) Complete the following table of equivalent values.

Binary	Octal	Decimal	Hexadecimal
1101.0101			
		31.25	

10. (6 pts) Calculate the following
    a) $(10111)_2$ times $(110)_2$
    b) $(1001)_2$ minus $(0110)_2$

11. (9 pts) Calculate the following
    a) $(11001)_2$ plus $(101)_2$
    b) $(11010)_2$ minus $(10101)_2$ using 1's complement representation
    c) $(1101)_2$ times $(1001)_2$

12. (9 pts) Complete the following table of equivalent values. Use binary numbers with a sign bit and 5 bits for the value

Decimal	Signed Magnitude	Two's Complement	One's Complement
-11			
			111101
	100001		