The University of Alabama in Huntsville
ECE Department
EE 202 – 02
Spring 2014
Test 1
February 20, 2014

Name: _____

In order to get full credit, you must show your work!

$x + 0 = x$	$x \cdot 1 = x$
$x + x' = 1$	$x \cdot x' = 0$
$x + x = x$	$x \cdot x = x$
$x + 1 = 1$	$x \cdot 0 = 0$
$(x')' = x$	
$x + y = y + x$	$xy = yx$
$x + (y + z) = (x + y) + z$	$x(yz) = (xy)z$
$x(y + z) = xy + xz$	$x + yz = (x + y)(x + z)$
$(x + y)' = x'y'$	$(xy)' = x' + y'$
$x + xy = x$	$x(x + y) = x$

1. (1 point) _____ (True/False) Complements are used in digital computers to simplify the subtraction operation.
2. (1 point)._____ (True/False) Unsigned numbers represent only positive numbers.
3. (1 point) _____ (True/False) Signed numbers represent only negative numbers.
4. (1 point) _____ (True/False) Sum of products form is OR gates followed by AND gates.
5. (1 point) _____ (True/False) All decimal numbers can be represented exactly in binary.

6. (10 points) Convert (231322_4) to decimal:

7. (5 points) For what value of x is the following equation true?

$25_x * 13_x = 347_x$

8. (10 points) Reduce ABC + A'B + ABC' to a minimum number of literals using Boolean algebra.

9. (10 points) Find the product of sums representation for the following function.
F(A, B, C) = Σ(0, 1, 2, 4, 6)

10. (20 points) Convert decimal +55 and +75 to binary, using the 8-bit signed-2's-complement representation. Then perform the binary equivalent of (-55) + (-75). Convert the answer back to decimal and verify that it is correct or explain why it is not.

11. (5 points) Convert 00101010011100101010001111001010101001 to hexadecimal

12. (5 points) Convert F(A, B, C, D) = Π(1, 5, 6, 8, 9, 15) to the other canonical form.

13. (15 points) Find all the prime implicants for the following Boolean function, and determine which are essential:

F (w, x, y, z) =Σ (0, 2, 4, 5, 6, 7, 8, 10, 13, 15)

14. (15 points) Simplify the following Boolean function, using four-variable maps:

F (w, x, y, z) = Σ(0, 2, 3, 6, 9, 12)

d (w, x, y, z) = Σ(4, 8, 10, 14)