The University of Alabama in Huntsville
ECE Department
EE 202 – 02
Test 1
October 4, 2016

Name: _____

In order to get full credit, you *must* show your work! You may use additional sheets of paper for your work, please put your name on each additional sheet. You *may* use a calculator.

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

1. (1 point) A _____ code is one in which only one bit in the code group changes in going from one number to the next.
2. (1 point).A group of binary cells is called a _____.
3. (1 point) The _____ law states that $x(y + z) = xy + xz$.
4. (1 point) The principle of _____ states that every algebraic expression of Boolean algebra remains valid if the operators and identity elements are interchanged.
5. (1 point) The _____ of a function F is obtained from an interchange of 0's for 1's and 1's for 0's in the value of F.
6. (10 points) Convert (51032_6) to decimal:

7. (15 points) Obtain the truth table of the following function and express it in sum-of-minterms and product-of-maxterms forms.

(cd +a b'c + bd')(a' + b + d)

8. (10 points) Reduce a'bc + abc' + abc + a'bc' to a minimum number of literals using Boolean algebra.

9. (15 points) Convert decimal +64 and +72 to binary, using the 8-bit signed-2's-complement representation. Then perform the binary equivalent of (-64) + (-72). Convert the answer back to decimal and verify that it is correct or explain why it is not.

10. (5 points) Convert 10110111001100011100010110101011 to hexadecimal

11. (15 points) Find all the prime implicants for the following Boolean function, and determine which are essential:

$F(w, x, y, z) = \Sigma (1, 2, 3, 4, 6, 7, 8, 9, 11, 12, 13, 14)$

12. (15 points) Simplify the following Boolean function, using a four-variable map.

$F(w, x, y, z) = \Sigma(0, 2, 3, 5, 12, 13))$

$d(w, x, y, z) = \Sigma(4, 8, 10, 14)$

13. (10 points) Convert the following circuit into a circuit that contains only NAND gates.