The University of Alabama in Huntsville
ECE Department
EE 202 – 01
Test 1
February 21, 2017

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) The output of of a two input AND gate is 1 if _____ of the inputs is 1.
2. (1 point).Definitions of logical operations may be listed in a compact form called _____.
3. (1 point) A _____ is a single variable within a term, in complemented or uncomplemented form.
4. (1 point) A _____ is a group of binary cells.
5. (1 point).For n bits, there are _____ distinct combinations of 0s and 1s.
6. (10 points) Convert (20453_7) 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.

(w'+ x'z)(xyz + yz' + wx)

8. (15 points) Convert decimal +106 and +72 to binary, using the 8-bit signed-2's-complement representation. Then perform the binary equivalent of (-106) + (-72). Convert the answer back to decimal and verify that it is correct or explain why it is not.

9. (5 points) Convert 01110011100011110000101010 1100 to hexadecimal

10. (15 points) Find all the prime implicants for sum of products for the following Boolean function, ***and*** determine which are essential:

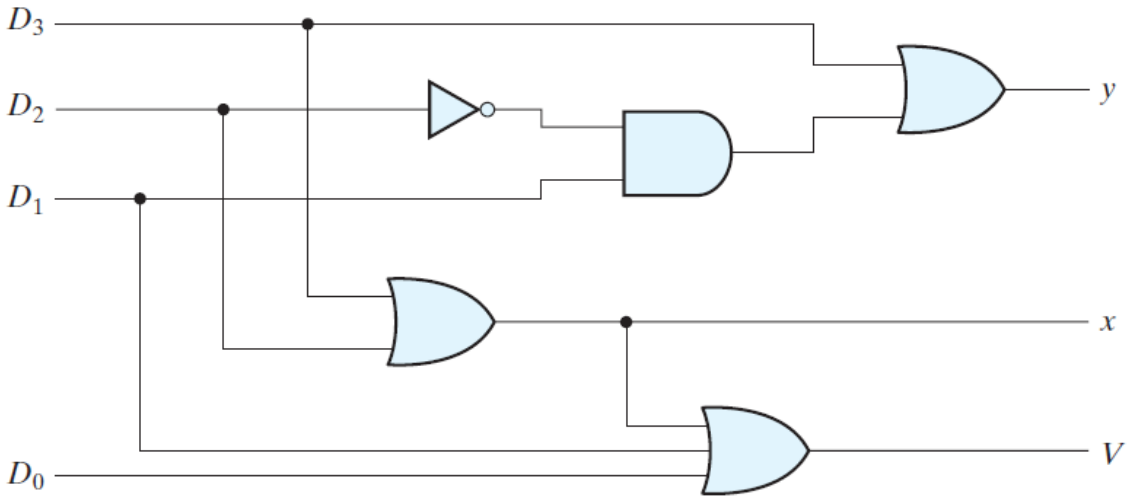
$F(w, x, y, z) = \Sigma(1, 5, 6, 7, 8, 9, 10, 14, 15)$

11. (15 points) Simplify the following Boolean function as a product of sums, using a four-variable map.

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

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

12. (10 points) Convert the following circuit into a circuit that contains only NAND gates.



13. (10 points) Formulate a weighted binary code for the decimal digits, using weights 1325