EE 302, Introduction to Electrical and Computer Engineering

Dr. Archie Holmes, Jr.

Exam #1

Name: _____

SSN: _____

Please remember….

- **Read the entire exam before starting**
- **If you feel you need more information than is given, please ask!!!**
- **Show all work for credit!!!**
- **Relax!!!**

This exam contains 9 pages and 4 problems along with some extra credit questions
Give units to all answers where applicable

Problem #1	_____
Problem #2	_____
Problem #3	_____
Problem #4	_____
Bonus (Extra Credit)	_____
Total	_____

This information will be provided when I return the exam

Class Average = _____

Standard Deviation = _____

PROBLEM #1. INTELLECTUAL PROPERTY (20 POINTS)

a) List the **four** different types of intellectual property discussed in class and provide a brief definition or example for each.

b) In the article from Atlantic Monthly, *Who Will Own Your Next Good Idea*, there were a number of examples used to illustrates the problems with intellectual property in the future. Name **two** of the products/ideas that were used as an example in this article.

PROBLEM #2. BINARY/DECIMAL CONVERSION (25 POINTS)

a) Complete the table below. For binary conversion, use the number of bit given. If the number of bits is not given, use **the minimum number of bits** needed in order to accurately represent the number. Note that both signed and unsigned binary numbers are asked for.

Decimal Number	Number of Bits	Unsigned Binary Number
17		
283	**9**	
***a* = _____**	**9**	**110011101**

Binary Number	Number of Bits	Signed Binary Number
-57		
	6	**110011**
-413		

b) Do the following arithmetic in binary (17+*a*-283) where *a* comes from table above. Use the twos complement method for subtraction. You need to show **all work for credit**.

PROBLEM #3. BOOLEAN EXPRESSIONS (25 POINTS)

a) Prove whether the following expression is true or false: $(ab + bc)' = a'c + b'a + b'$

b) Express the following Boolean expression in terms of its minimum sum-of-products **and** product-of-sums form.

Q = $W'X'Y'Z' + WXYZ' + WX'Y'Z + WX'Y'Z' + W'X'Y'Z + WXYZ + W'X'YZ$

PROBLEM #4. SUBTRACTION CIRCUIT (30 POINTS)

The goal of this problem is to design a circuit which subtracts two **two-bit** binary numbers (*A* and *B*) from each other placing the result in *R* (*R* = *A* - *B*), a signed binary number. Provide logic circuit diagrams for the MSB and LSB of the circuit's output. *Hint*: Show your steps for partial credit.

EXTRA CREDIT (3 POINTS TOTAL)

1) What was the name of the hurricane which hit the United State's Eastern Coast last week?

2) The first lady is contemplating a run for the US senate. Name the state from which she is planning to run?

3) Within the last month, violence has broken out in East Timor. Why has the violence erupted there?