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 illustrate 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.

<table>
<thead>
<tr>
<th>Decimal Number</th>
<th>Number of Bits</th>
<th>Unsigned Binary Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>283</td>
<td>9</td>
<td>110011101</td>
</tr>
<tr>
<td>( a = ) ______</td>
<td>9</td>
<td>110011101</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Binary Number</th>
<th>Number of Bits</th>
<th>Signed Binary Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>-57</td>
<td>6</td>
<td>110011</td>
</tr>
<tr>
<td>-413</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

\[ Q = W'X'Y'Z' + WXYZ' + WX'YZ + WX'YZ' + WX'Y'Z + WXYZ + W'X'YZ \]
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?