1. Determine the decimal value of the following unsigned binary numbers:

   a. 11000

   b. 110001  [20 points]

2. Show the step-by-step addition of the following two 10-bit unsigned binary values, including showing the carry bit to each successive column:

   \[
   \begin{array}{c}
   0011100011 \\
   + 0001101110 \\
   \end{array}
   \]

   0011100011

   + 0001101110  [20 points]

3. Using ASCII code set (given in Figure 4.3), show the internal binary representation for the following character strings:  [10 points]

   a. Mike

   b. $25.00

3(b). How many binary digits would it take to represent the following phrase in ASCII code? In UNICODE?  [10 points]
4. Use the Circuit Construction Algorithm of Section 4.4.2, to design a circuit using only AND, OR, and NOT gates to implement the following truth table.

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

The above operation is termed logical implication, and it is an important operator in symbolic logic. [20 points]

5. Assume that the values $v$, $w$, $x$, $y$ and $z$ are stored in memory locations 200, 201, 202, 203 and 204 respectively. Using any of the machine language instructions in Section 5.2.4, translate the following algorithm operations into their machine language equivalents. [20 points]

a. Set $v$ to the value of $x - y + z$

b. Set $v$ to the value $(w + x) - (y + z)$

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