CS150 - Computer Organization and Architecture
Homework #3 - Fall 2022

1. Convert the following binary numbers to equivalent decimal numbers.
   
   - (a) \((11100.001)_2\) \(28.125\)
   
   - (b) \((1001010.101)_2\) \(74.625\)
   
   - (c) \((10101.01)_2\) \(21.25\)
   
   - (d) \((1001011.111)_2\) \(75.875\)
   
   - (e) \((10110.010)_2\) \(22.25\)

2. Perform the following hexadecimal arithmetic.

   a. \(A4\) \(\times\) \(B\) 
      
      \[70C\]
      
   b. \(8FF\) \(+\) \(402\) 
      
      \[D01\]
      
   c. \(E06\) \(-\) \(7F\) 
      
      \[D87\]
      
   d. \(46B\) \(-\) \(1FF\) 
      
      \[26C\]
      
   e. \(68\) \(\times\) \(12\) 
      
      \[786\]
      
   f. \(C8A\) \(+\) \(3FE\) 
      
      \[1088\]
3. Convert the following decimal numbers into equivalent 16-bit two's complement binary numbers. Please show your work.

- \((211)_{10}\)  00000000 || 101 0011
- \((-211)_{10}\) ||| 111 0 010 1101
- \((32767)_{10}\) 0111 1111 1111 1111
- \((-9)_{10}\) ||| 1111 1111 1110 0
- \((-2)_{10}\) ||| 1111 1111 1111 0

4. One of the circuits below is combinational, whereas the other is sequential. Please label the circuits as such, and justify your answer.

![Combinational Circuit](image1)

![Sequential Circuit](image2)

Answer Here:

*combinational*  
*sequential*
5. Generate a gate-level logic circuit diagram which satisfies the truth table shown below. Please use only AND, OR, and NOT gates and be sure to clearly denote wire junctions.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Z</th>
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<tbody>
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[Diagram of a logic circuit with inputs A, B, and C and output Z]