Name: _____

CS 33003 **Exam #1** **CompOrg**

Monday 21 September 1998

1. For each of the following statements, write the word "true" below the statement if it is true, and "false" below the statement if it is false. (5 points each = 20 points)

   a. Mechanical adding machines usually have more significant digits than slide rules.

   b. Mechanical adding machines can use logarithms to multiply and divide.

   c. Early computers were used to compute artillery tables during World War II.

   d. Before becoming president of IBM, Thomas Watson was a highly successful stockbroker.

2. Give the truth table for a combinational circuit that takes a two-bit input labeled A_1A_0 and a two-bit input labeled B_1B_0 and produces a one-bit output C that is true (1) if the value A_1A_0 is numerically *greater than* the value B_1B_0 and is false (0) otherwise. (15 points)

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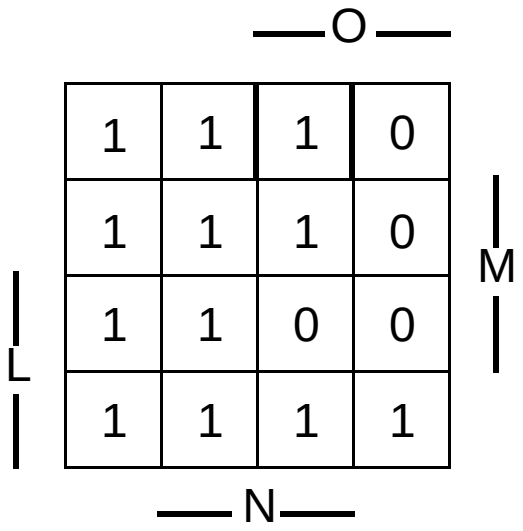
3. Given the Karnaugh Map below, draw the appropriate ovals on the map, and write the simplified two-level sum-of-products expression to the right of the map. (20 points)



1	1	1	0
1	1	1	0
1	1	0	0
1	1	1	1

4. Draw the combinational circuit that *directly* corresponds to the Boolean equation $z = (b \oplus c') + (ab)'(a'+c)'$ in the space below. (20 points)

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5. Perform the following conversions, showing your work. (5 points each = 15 points)

   a. 29_{10} to base 2

   b. 1100010101_2 to base 8

   c. $15A_{16}$ to base 10

6. This question explores the difference between different types of encoding. (5 points each = 10 points)

   a. Does it require more or less bits to store "23" as a ASCII character string than as a number? Explain your answer.

   b. What is the basic idea behind Huffman encoding? (Note — I'm not asking for the entire algorithm or a detailed example, just the basic idea.)