COMP278 MIDTERM REVIEW

NAME _____

Complete this exam within 50 minutes. Write legibly and check your work. Good luck!

1. Binary arithmetic (20%)

Perform the following basic arithmetic operations.

(1) $(10111101)_2 + (10101101)_2$.

(2) $(10000111)_2 - (1011011)_2$.

2. Number representation (20%)

Convert the following numbers to the specified bases:

(1) $(1400217236)_8$ in binary.

(2) The number above, $(1400217236)_8$, in hexadecimal.

(3) $(278)_{10}$ in binary.

(4) The number above, $(278)_{10}$, in octal.

3. Combinational circuit design (60%)

Given two 2-bit binary numbers A & B, design a circuit that outputs F, the remainder of $(\frac{A}{B})$. If a division by zero has occurred, let $F = 3$.

(1) To the left, draw the truth table for this circuit.
Label inputs as: A_1, A_0, B_1, B_0. Label the output as F_1, F_0.
(2) To the right, write the Boolean algebraic expressions separately for F_1 and F_0, then simplify them.

(3) Draw the logic diagram for this circuit based on the simplified Boolean algebraic expressions. Label inputs and outputs as in the truth table.

(4) Use DeMorgan's Law to derive $\overline{F_0}$.