

## COMP278 MIDTERM REVIEW 2

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 on binary numbers.

$$\begin{array}{r} (1) \quad 10011111 \\ + 00011011 \\ \hline \end{array}$$

$$\begin{array}{r} (2) \quad 10100 \\ - 1011110 \\ \hline \end{array}$$

## 2. NUMBER REPRESENTATION (20%)

Convert the following numbers to the specified bases:

(1)  $(37673375316)_8$  in binary.

(2) The number above,  $(37673375316)_8$ , in hexadecimal.

(3)  $(2471)_8$  in binary.

(4) The number above,  $(2471)_8$ , in decimal.

### 3. COMBINATIONAL CIRCUIT DESIGN (60%)

Given a 4-bit binary number, produce the even parity code for that number. The output should just be the even parity bit (the number of true bits should be even).

- (1) To the left, draw the truth table for this *even parity* circuit.  
Label inputs as:  $A_3, A_2, A_1, A_0$ . Label the output as: *EvenParity*.
- (2) To the right, write the Boolean expression for *EvenParity*, then simplify it.

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

- (4) Use DeMorgan's Law to derive  $\overline{EvenParity} = OddParity$ .