ECE 150 Homework 1

Fall 2022.

Due September 28th before class.

Hand in submission in person or upload as a PDF to MS Teams.

Show all work for any credit.

1. Convert 42_{10} to:
    a. Base 2
    b. Base 5
    c. Base 16
2. Convert the following values to base 10
    a. 10111001_2
    b. 4213_5
    c. $D3B_{16}$
3. Convert $E17_{16}$ to binary and octal without converting to base 10.
4. Perform the addition $32_{10} + 23_{10}$ in binary.
5. Perform the subtraction $23_{10} – 32_{10}$ in binary.
6. Use Boolean Algebra to simplify these equations:
    a. $W = \overline{A}\,\overline{B}\,C + BC + A\,\overline{B}\,C$
    b. $X = \overline{AB}\,C + \overline{B+C}$
    c. $Y = \overline{\overline{AB}+C}$ + ABC
    d. $Z = \overline{AC+\overline{B}+C}$
7. Given the circuit in Figure 1
    a. Write the Boolean function for F.
    b. Fill out the truth table, showing intermediate nodes if needed.
    c. Simplify the expression using a Karnaugh map.
    d. Use the simplified expression to draw a sum of products implementation of the circuit

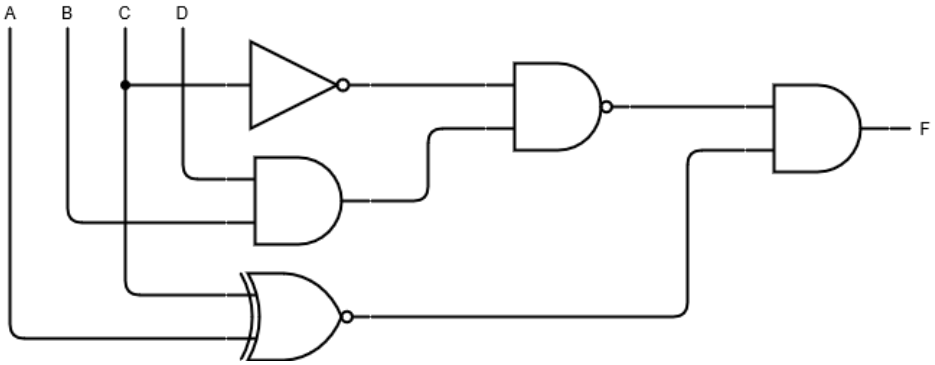

Figure 1

8. From the truth table below:

a. Write the sum of minterms expression for F (direct from the table)

b. Using a Karnaugh map find a simplified expression for F
c. Draw a diagram of the simplified expression as a sum of products circuit

A	B	C	D		F
0	0	0	0		1
0	0	0	1		1
0	0	1	0		1
0	0	1	1		0
0	1	0	0		0
0	1	0	1		1
0	1	1	0		0
0	1	1	1		1
1	0	0	0		1
1	0	0	1		1
1	0	1	0		0
1	0	1	1		0
1	1	0	0		0
1	1	0	1		1
1	1	1	0		0
1	1	1	1		1