Homework Assignment #1

Assigned: 21/10/2022
Due: 30/10/2022 11:55 PM

1. Find the binary, octal, hexadecimal representations of the numbers. You can first find the binary and use it to find the others.
   ```
   a. 370
   b. 81.8125
   c. 0.78125
   ```

2. Fill in the following table

Decimal	Binary	Octal	Hexadecimal
153			
	10010110		
		137	
			72

3. Assume that you are using 4 digit 2's complement binary system.

   a. Show the range of integers that can be represented in 2's complement signed number system.

   b. Do the following arithmetic operations and detect overflows.

		0101			0101			1101	
	+	0010		+	1110		+	1111	
Overflow?									

		1010			0111			0110	
	+	1001		+	0110		−	1010	
Overflow?									

4. Calculate the binary equivalent of 1057/2048 using only eight (8) bits in the fraction. Then convert the resulting binary number back to decimal. What is the error in the binary representation? How many bits are needed to fully represent 1057/2048 in binary number system?

5. Express the following function as a sum of minterms and as a product of maxterms
   $F(x,y,z,t) = x'y' + yz + xz'$

6. Implement the Boolean function $F(x,y,z) = xyz' + xy' + y'z$ using
   a. Only two-input NOR gates
   b. Only two-input NAND gates

7. Demonstrate the validity of $y + x'z = (x' + y)(y + z)$ by a truth table.
8. Simplify $(a + b + c')(b'c + a'c')$ to a minimum number of literals.
9. Simplify $a'b'c + ab'c' + ab'c + a'b'c'$ to a minimum number of literals.
10. Find the dual of $a + (b' + ce' + bd'e)$.
11. Find the complement of $a + (b' + c + c'd')$.
12. Draw the logic diagram of $a + a'(b'c + bde)$.
13. Convert $F(x, y, z) = \sum(2, 3, 6)$ to product-of-maxterms.