Week 1 Tutorial

1. Calculate the decimal values of the following numbers:

   a. 101110_2

   b. 6012_8

   c. FED_{16}

2. Convert 11101101110_2 into hexadecimal and then decimal.

3. How many bits do you need at least to represent integers in range [-10, 10] (inclusively)? Explain briefly your answer.

4. Convert the following from the given base to the others listed in the table (show only 3 decimal places, no need to round your answers)

Decimal	Binary	Octal	Hexadecimal
335.23			
	1001101.101		
		605.2	
			FF0A.B

5. Find the 10-bit 2's complement representations of 341 and -422, hence perform binary calculation of 341 – 422. Show how you check your answer.

6. Convert the number **145.84375** to a IEEE-754 binary floating point representation.

7. An advanced computer represent information in groups of 64 bits. How many different integers can be represented in a) binary, b) BCD without signs, and c) 8-bit ASCII, all using 64 bits?

8. Simplify algebraically
a) F = AB'(C+D)+C'D'
b) G = (A + B)(A + C')(A + D)(BC'D + E)

9. Consider the Switching Algebra expression
$$F(A, B, C) = A'C' + A'BC' + (A+B')(A+B'+C)$$
and answer the following questions:
a. Explain in your own words the concept of *minterm*.
b. Derive the Truth Table for F and write the *maxterm* expansion for F'.
c. Simplify the expression for F using theorems of Switching Algebra