# Sheet # 1 Digital Design 2024

**Problem#1**

 Obtain the 1's and 2's complements of the following binary numbers:
(a) 00010000 (b) 00000000
(c) 11011010 (d) 10101010
(e) 10000101 (f) 11111111.

**Problem#2**

Show how the number **-122**is represented in binary using

  a) 8-bit Signed magnitude system
  b) 8-bit two's complement system

**Problem#3**

  a)  Show how this computer represents the number (-42)10in these two
   different binary systems (an 8-bit signed magnitude and 8-bit two's
   complement).
  b) Show how this computer uses two's complement arithmetic to add these
   numbers in binary (77 + (-42)).

**Problem#4**
Draw logic diagrams to implement the following Boolean expression:
a) $Y = A + B + B'(A + C')$          b) $Y = C(B \oplus D) + A'$
c) $Y = (A \oplus C)' + B$             d) $Y = (A' + B')(C + D')$

**Problem# 5**
Draw the truth Table of:
a) $A + A'B$
b) $A' + B' + C$
c) $A(B + AC + A')$
d) $AB + AB' + B'C$

# Problem #6
Perform subtraction on the given unsigned binary numbers using the 2's
complement. Where the result should be negative, find its 2's complement and
affix a minus sign. (suppose numbers are represented in 8 bit)
(a) 10011 - 10010       (b) 100010 - 100110
(c) 1001 - 110101       (d) 101000 - 10101